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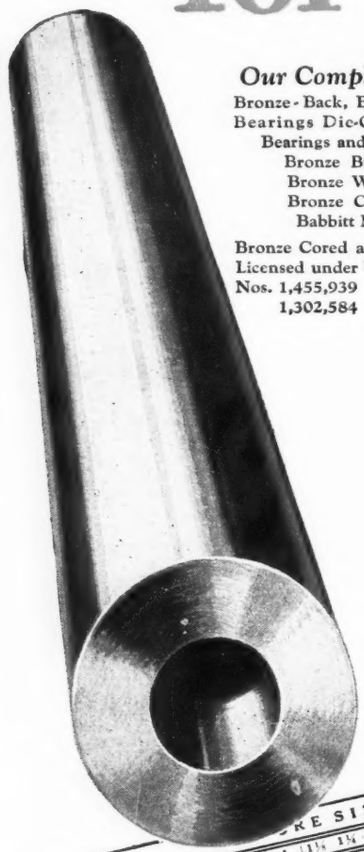

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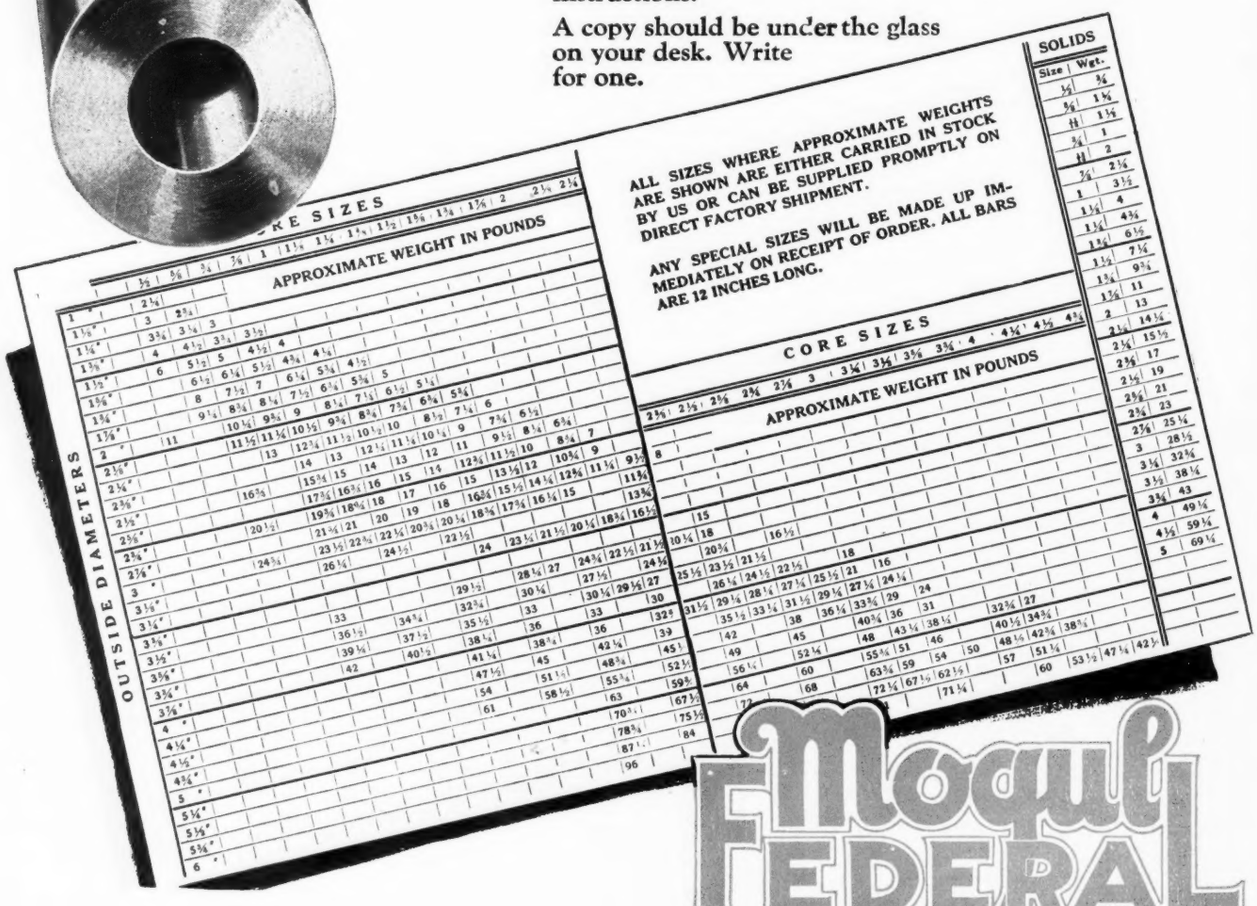
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AUTOMOTIVE INDUSTRIES
VOLUME 58 *Philadelphia, Saturday, April 7, 1928* NUMBER 14

Automotive Securities *Gain 50%* *in* Value in Year

Growing steadily in esteem of investors, although growth in earnings has not been striking. Net profit on net worth higher than in most other industries.

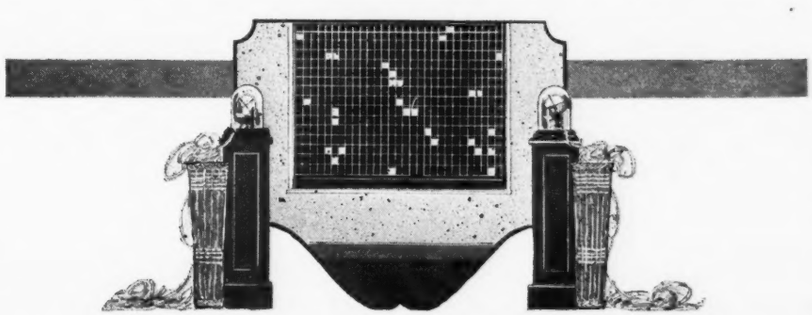
By John C. Gourlie

THE securities of automotive manufacturing companies are unmistakably growing in the esteem of investors. The market appreciation of these securities in the last year or two has been particularly significant, since except for a small minority of companies there has been no striking growth in earnings to account for the advances. It may be that there is a greater realization of the stability of automotive manufacturing, and whatever justification there is for this increase in confidence will appear from an analysis of the present financial status of the industry and an important group of individual companies.

At the end of 1927, the period covered by the present analysis, the outstanding securities of 23 motor car manufacturing companies were appraised in the stock market at $3,890,877,000, a 50 per cent gain in a year, the total at the end of 1926 for this group—comprising all the companies actively traded in—having stood at $2,585,557,000.

This gain was in volume largely attributable to General Motors, but the other companies made a creditable showing, their appreciation in the market having been 25 per cent, or from $1,112,570,000 at the end of 1926 to $1,890,877,000 at the end of 1927.

A not less impressive development took place among parts and accessory manufacturing concerns. The securities of 21 of these companies rose in value 26.5 per cent in 1927, or from $336,613,000 to $426,082,000. Since the first of the year there have been further notable gains both in the vehicle and in the parts groups, but this appreciation, in so far as it does not represent purely speculative activity, is based on prospects for 1928 earnings and therefore has not been considered in the calculation.



Despite the marking up of stock prices in 1927, the companies were not selling remarkably high in relation to earnings. A group of 13 car manufacturing concerns for which comparable figures are available was appraised in the market on Jan. 1 at $3,668,807,000 and had net profits last year of $320,151,722. These companies then were selling at 11.5 times earnings. Excluding General Motors, 12 companies with earnings of $81,832,000 were selling for $1,168,807,000, or 14.3 times earnings. The basis for the calculation is highly conservative, as four of the companies involved reported deficits rather than profits last year. It is probable that almost any other stock market group would be found to be selling at higher prices in relation to net profits.

The accessory companies, it would seem, are even more moderately priced. Eleven of these concerns with a market value of $354,850,000 had net profits of $28,262,640 last year and consequently were selling for 12.5 times earnings. The old theory that stocks should sell for about 10 times earnings is no longer tenable in these days when a constantly growing investment sum is going into the purchase of common and preferred stocks rather than into bonds.

As already noted, 1927 was not by any means a particularly favorable year for profits in the car manufacturing field. The group of companies as a whole showed a major

gain, but this was almost entirely due to the influence of General Motors. In the table showing net profits and profits per unit only the companies which up to the time of compilation had reported profits rather than deficits were included.

Totals for the nine companies in the table are as follows:

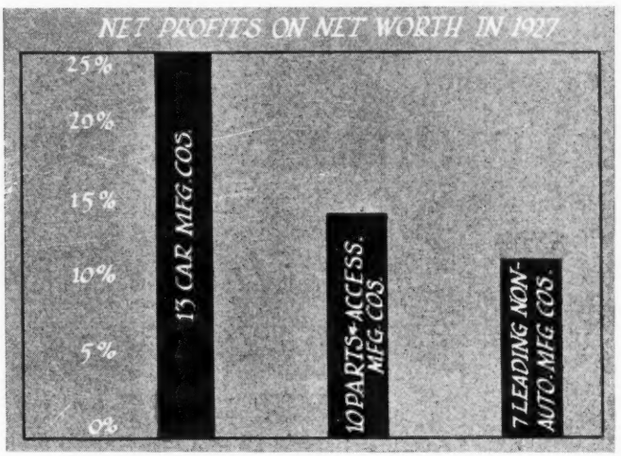
	1927	1926
Net profits	$326,414,342	$275,705,307
Estimated production in units	2,571,988	2,323,350
Average profit per unit	$127	$118
Excluding General Motors:		
Net profits	$88,095,000	$99,006,564
Estimated production in units	1,009,240	1,090,500
Average profit per unit	$87	$91

It will be noted that despite the small number of companies represented, the estimated total production for the group represents a large proportion of output for National Automobile Chamber of Commerce members. The figures are complicated somewhat by the inclusion of estimates of truck production for the companies making commercial vehicles, but probably nearly 90 per cent of N.A.C.C. passenger car production is represented.

Profit per unit figures, as drawn from published financial statements, are naturally misleading, but it is believed that they do establish the trend of per unit profits if not the actual figures. General Motors probably draws a larger proportion of its earnings from activities other than manufacture and sale of complete vehicles, the statement having been made in the 1927 report that half the net profits were from such sources.

It will be seen that net profits for the companies exclusive of General Motors declined nearly $11,000,000 last year as compared with 1926, and that production fell off slightly. Despite lower production and price cuts in some lines, profits per unit were fairly well maintained, which speaks well for the manufacturing and sales efficiency of the companies represented. The showing would have been slightly less favorable if the companies reporting deficits had been included.

A compilation made a year ago covering a group of 12 companies exclusive of General Motors showed a gain in production in 1926 of 11.2 per cent against a drop in profits of 37 per cent as compared with 1925. Apparently to quite an appreciable extent the tendency toward lower profits per unit was checked in 1927, a development which was strongly urged by *Automotive Industries*.



This chart gives a comparison of net profits on net worth earned in 1927 by 13 car builders, 10 parts and accessory manufacturers and a group of seven non-automotive companies

Turning to another profit ratio equally important to management and stockholders, the net profit on net worth for a number of car and parts manufacturing companies will be found in tables accompanying. Net worth is the stockholder's investment or equity and is obtained by adding the capital and surplus accounts to true reserves (excluding reserves for depreciation). Thus another way of obtaining the net worth figure would be to subtract from the liability side of the balance sheet the current and long term debt, representing borrowed capital.

Adding and averaging the figures in the table covering car manufacturing companies, including those reporting deficits, the following is obtained:

	All Companies	Excluding General Motors
Net profits	$ 320,151,722	$81,832,713
Net worth	1,285,374,675	488,126,185
Profit on net worth.	24.9%	16.8%

Considering only the companies reporting profits for 1927, the totals are as follows:

	Nine Companies	Excluding General Motors
Net profits	$ 326,414,342	$88,095,333
Net worth	1,240,788,059	443,539,569
Profit on net worth.	26.3%	20%

One of the interesting points about this table is that the bulk and weight of General Motors affects the average much less than in any other compilation yet made. Evidently the smaller companies are operating almost as successfully, so far as return on capital is concerned, as is the big combination of the industry.

Furthermore, over a period of years the industry has evidently been able to maintain or increase its profit on investment despite the greater intensity of competition we hear so much about. An analysis by the

Passenger Car Manufacturers' Net Profit on Net Worth

Company	Net Profit 1927	Net Worth Dec. 31, 1927	Net Profit on Net Worth
Auburn Automobile Co.	$687,150	$8,958,558	7.7%
Chrysler Corp.	19,484,880	85,160,188	22.9%
Dodge Bros., Inc.	9,641,427	52,102,037	18.5%
Gardner Motor Co.	*110,336***	4,443,764	.....
General Motors Corp.	238,319,009	797,248,490	29.8%
*Graham-Paige Motors Co.	*4,643,351***	13,196,728	.....
Hudson Motor Car Co.	7,512,814	50,883,742	14.8%
Hupp Motor Car Corp.	2,719,164	20,868,397	13.0%
†Nash Motors Co.	22,670,745	49,884,125	45.4%
‡Packard Motor Car Co.	13,441,291	54,260,632	24.7%
Peerless Motor Car Corp.	*725,733***	9,140,394	.....
Pierce-Arrow Motor Car Co.	*783,200***	17,805,730	.....
The Studebaker Corp.	11,937,862	121,421,890	9.8%

* Predecessor company—Paige-Detroit.
† Year ended Nov. 30.
‡ Four quarter figures to Nov. 30.
** Deficit.

National Automobile Chamber of Commerce issued late in 1925 and covering the calendar year 1924 showed that 48 car and truck manufacturing companies made 15 per cent on net worth. Although this included a greater proportion of the smaller companies than the tables given herewith, it also included Ford. With Ford excluded from the 1924 analysis, the profit on net worth was 13 per cent, so it seems fairly plain that the other companies have bettered this ratio in the intervening period.

As might, perhaps, have been expected, the average return on net worth for the accessory companies is slightly below the figure for the vehicle manufacturing concerns. The companies in the table show a net worth of $168,969,539 and profits last year of $28,253,254, making the percentage on net worth 16.7. This is a reasonably good average, however, and indicates that the making of parts and accessories is a more satisfactory business than it is sometimes considered. The individual companies in the table show a greater variation in earnings than the car companies and exceptional earning power is indicated in several instances.

Size Not So Important

In the N.A.C.C. compilation already referred to, 50 parts and accessory manufacturers earned 11.5 per cent on net worth. Here again it is apparent that a much larger number of the small companies were included, but enough figures have been given to show that size of company does not necessarily involve greater proportionate earning power. The parts and accessory companies, therefore, may well have bettered their earning ratio since 1924.

But perhaps the most striking comparison is between the automotive groups and a selected list of the leading companies in seven other manufacturing industries. So far as was possible at this time of year, in view of the lateness of publication of the financial statements of some companies, the soundest and most profitable industrial organizations of the country were selected, the list including Allis Chalmers, American Car & Foundry, American Can, American Radiator, Endicott Johnson, International Harvester and Fleischmann.

This group had a net worth of $582,295,869 and reported net profits of $81,119,459 last year, giving a profit ratio of 10.4 per cent. Evidently the automotive industry is a highly profitable one as compared with other manufacturing enterprises. The investment required for comparable profits, in other words, is lower in automotive manufacturing than in the average of other manufacturing lines. This point is particularly forcible when it is considered that no unprofitable or weak companies were included in the non-automotive list.

One other profit ratio deserves consideration—that of profit on sales. Such a ratio is of course fundamental to good management, but unfortunately very few companies publish sales figures. Of the companies reporting profits in 1927, the following are the only ones to report sales:

Company	Sales	Profit on Sales
Dodge Bros., Inc.	$ 173,581,526	5.6%
General Motors Corp.	1,269,519,673	18.8%
Hupp Motor Car Corp.	44,734,430	6.1%
The Studebaker Corp.	134,007,798	8.9%

Total sales were $1,621,843,427 and net profits $262,617,462, for an average of 16.1 per cent. Four of the miscellaneous group reported sales, the profit thereon being 15.7 per cent.

This article has considered mainly the operating income of the automotive companies. In the effort further to bring out the soundness and stability of the industry, the balance sheets of the companies will be analyzed in an early issue.

Parts and Accessories Companies' Net Profit on Net Worth

	Net Profit 1927	Net Worth Dec. 31, 1927	Net Profit on Net Worth
American Bosch Magneto Corp.	$469,174	$8,277,473*	5.7%
Borg & Beck Co.	1,004,359	3,609,271	27.8%
Continental Motors Corp.	1,248,831	28,157,099	4.4%
Eaton Axle & Spring Co.	779,191	8,122,067	9.6%
Electric Storage Battery Co.	6,501,426	43,299,877	15.0%
Gabriel Snubber Mfg. Co.	960,331	2,241,631	42.9%
Moto Meter Co.	742,000†	3,064,487*	24.2%
Spicer Mfg. Corp.	1,116,352	14,327,770	7.8%
Stewart-Warner Speedometer Corp.	5,210,053	25,051,808	20.8%
Timken Roller Bearing Co.	10,221,537	32,818,056	31.2%

* Sept. 30, 1927. † Estimated.

Approximate Profits Per Unit of Passenger Car Companies Based on Financial Statements Available at Time of Compilation

	1927 Net Profits	Per Car	1926 Net Profits	Per Car
Auburn	$687,150	$51	$949,132	$112
Chrysler	19,484,880	100	15,448,586	91
Dodge	9,641,427	48	21,591,919	65
General Motors	238,319,009	152	176,698,743	143
Hudson	7,512,814	27	5,372,874[2]	22
Hupp	2,719,164	66	3,507,628	74
Nash	22,670,745[1]	181	23,346,306[1]	170
Packard	13,441,291[3]	354	15,750,000[4]	450
Studebaker	11,937,862	102	13,042,119	111

[1] 12 months ended Nov. 30
[2] 13 months ended Dec. 31
[3] 4 quarters ended Nov. 30
[4] 12 months ended Aug. 31

THE Belgian Minister of National Defense plans to purchase 50 tractors for the Belgian army and will hold a competition during the month of May next. Two types of tractors are required, for hauling pieces of artillery of 4 and 6 tons respectively. The weights of the two types of tractor must not exceed 3 and 6 (metric) tons respectively. They must be capable of hauling the field pieces over any kind of territory accessible to the latter and especially over soft ground or ground which has been torn up by bombardment. The tractors when drawing a full load must be capable of a speed of 12½ m.p.h. over level roads, and of 1¼ m.p.h. up a 20 per cent grade.

New Plant *Lowers* Oakland-Pontiac Assembly Costs

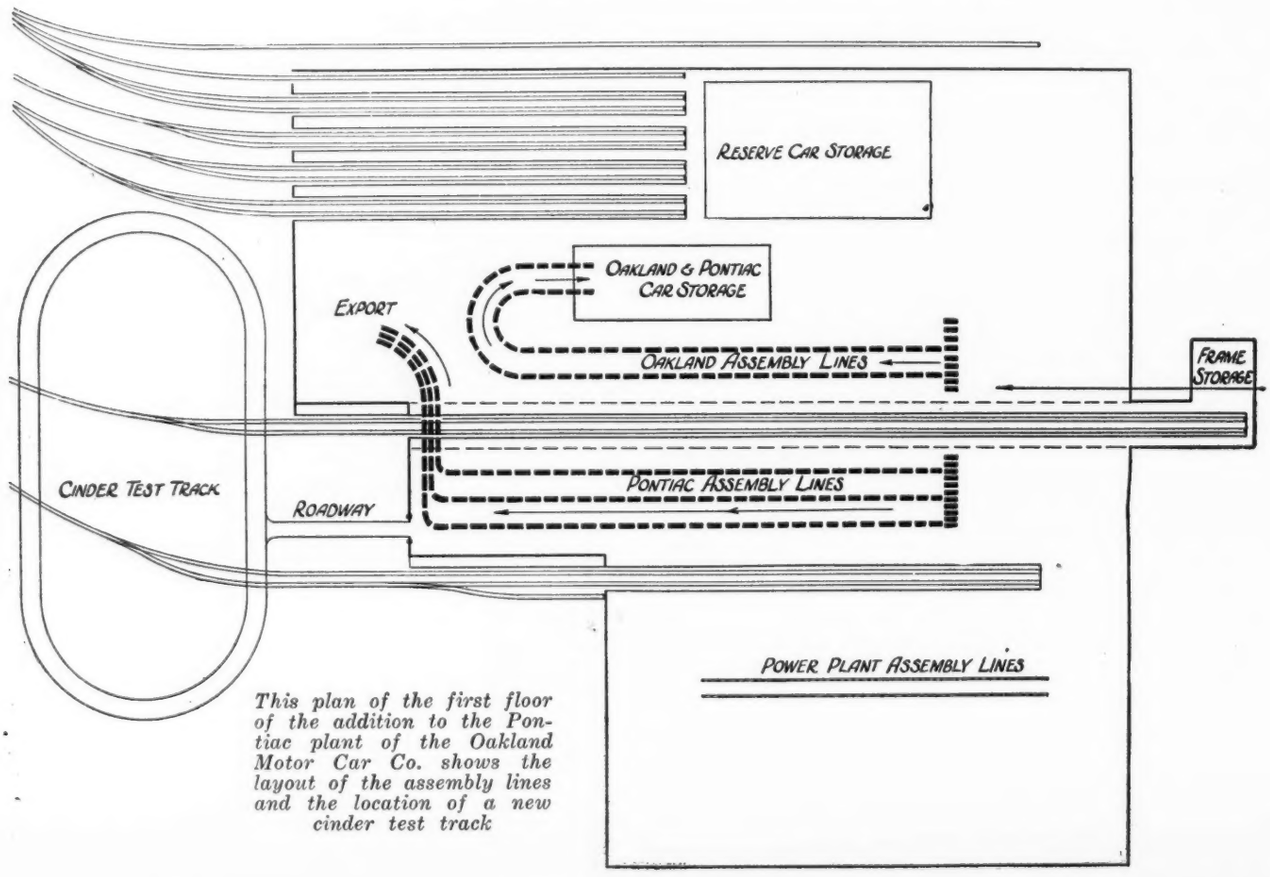
Recent completion of $3,000,000 addition puts all assembly operations under one roof and makes possible a number of manufacturing economies.

By A. F. Denham

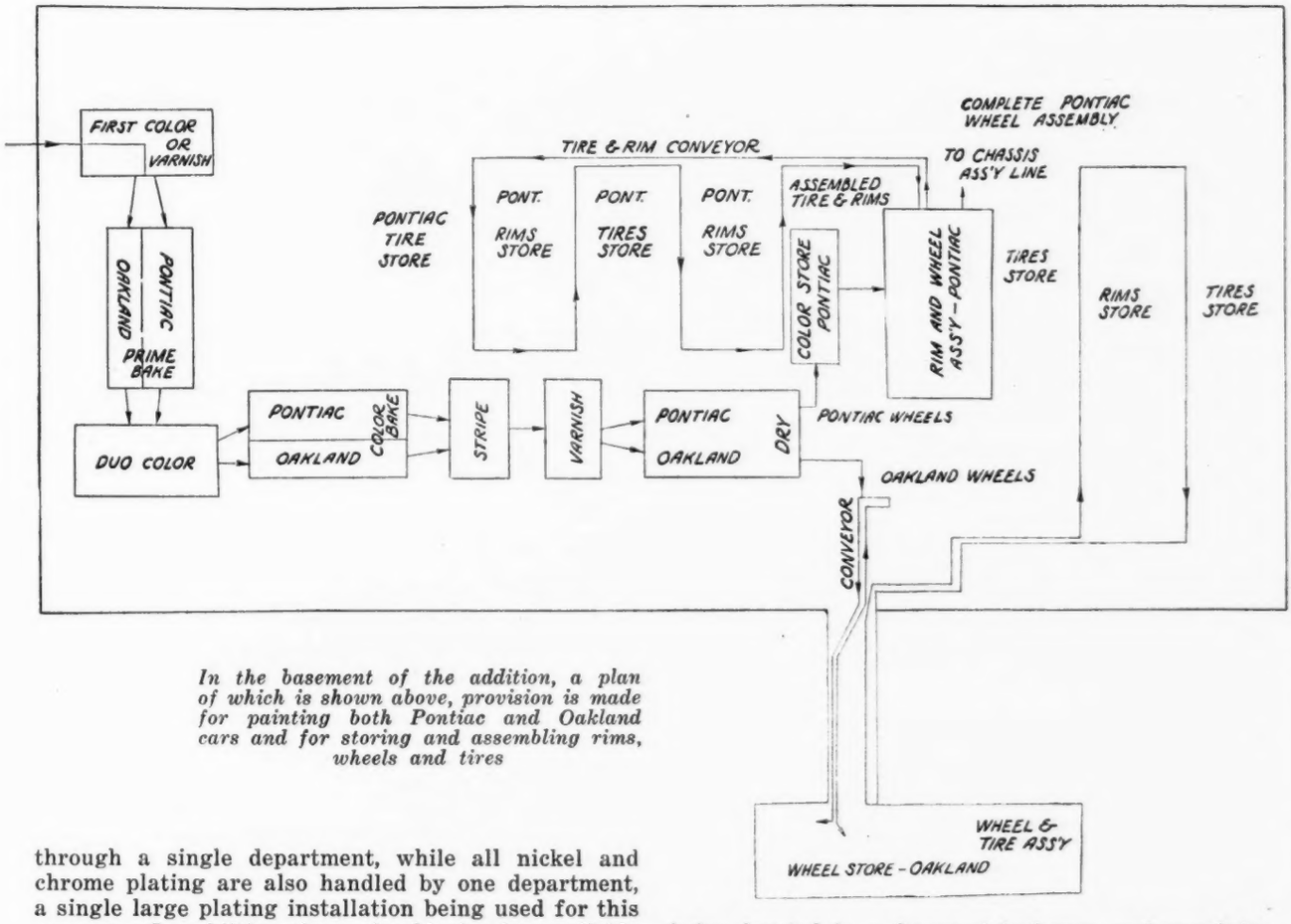
FOUR months ago preparations were initiated for the construction of a $3,000,000 addition to the new Pontiac plant of the Oakland Motor Car Co., to house the assembly of the Oakland All-American Six and to effect manufacturing economies due to elimination of duplication of operations for parts on both Oakland and Pontiac. The 580,191 sq. ft. of additional building space has now been completed and installation of machinery is progressing rapidly. The entire addition is being built at a cost of $3,000,000, of which the building itself represents a cost of less than $3 per sq. ft.

Nearly all the machinery to be used in the new plant will be entirely new, although a portion of the equipment now used in the old assembly plant will be transferred. The old assembly plant will be used for material storage.

Two assembly lines will be installed in the new plant, each having a production capacity of 40 cars per hour. In addition the plant will house a number of sub-assemblies, including frames, front and rear axles, wheels and tires, all open bodies, and all sheet-metal work. Due to the combining under one roof of Pontiac and Oakland assembly plants, a number of manufacturing economies have been made possible. For instance, there is a single department to take care of the hoods for both cars. Wheels for both Oakland and Pontiac are also finished in one department, and from thence conveyed to the respective final assembly lines. All the enamel ware for both cars comes



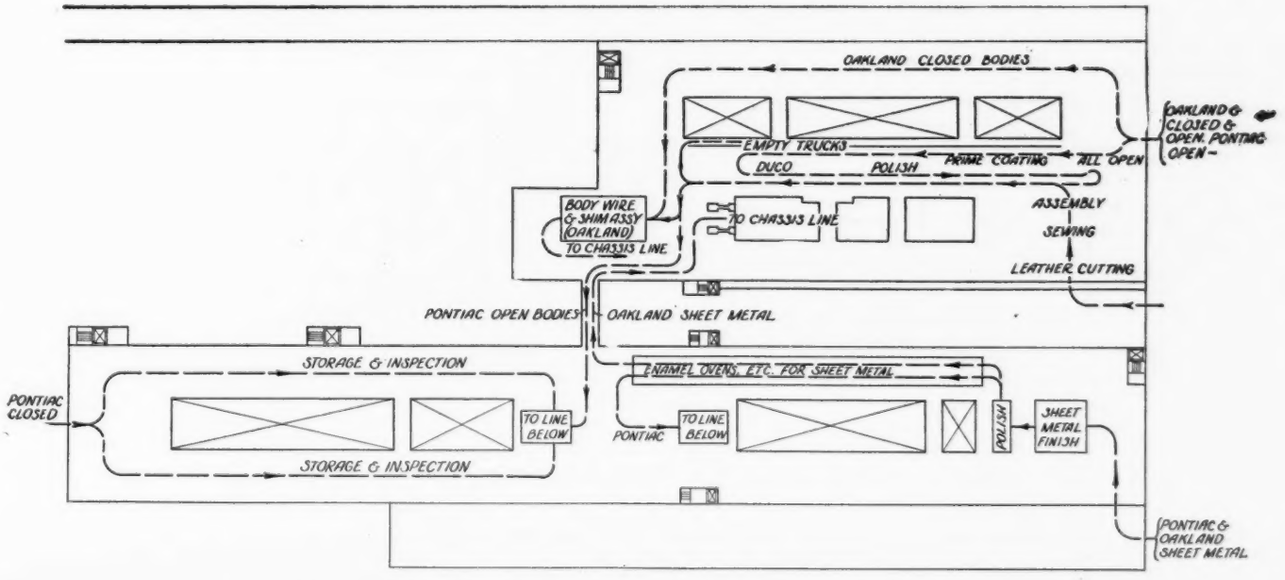
This plan of the first floor of the addition to the Pontiac plant of the Oakland Motor Car Co. shows the layout of the assembly lines and the location of a new cinder test track



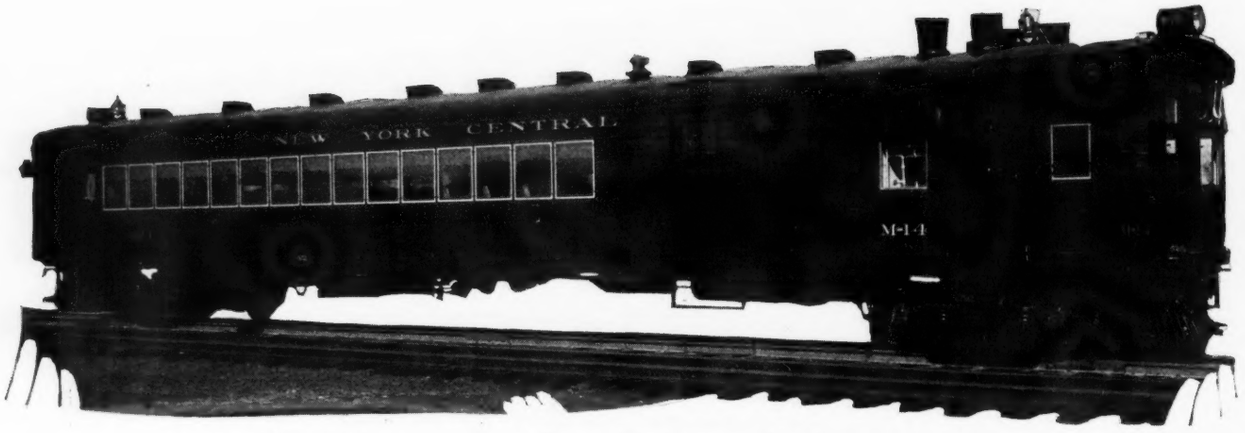
In the basement of the addition, a plan of which is shown above, provision is made for painting both Pontiac and Oakland cars and for storing and assembling rims, wheels and tires

through a single department, while all nickel and chrome plating are also handled by one department, a single large plating installation being used for this purpose. In addition there should also be available economies due to the reduction of overhead by combining supervision of similar operations for both cars. Such factors as combining export and frame storage departments for both cars should also assist materially in reducing handling costs. A departure from common practice is also found in the centralization of Duco equipment, a battery of color mixing grinders being located in a fireproof inclosure and supplying the ready mixed colors through air pressure to the various parts of Oakland and Pontiac assembly and sub-assembly divisions through piping.

The new addition gives the Oakland Motor Car Co. a combined floor space of 3,451,600 sq. ft. of which the area of the Oakland All-American Six factories represents 2,011,600 sq. ft.



This drawing shows the plan of the second floor and the various operations centered there



Seventy-five passenger railcar with two gas-electric power units

Mack Develops Line of *Gas-Electric* Railcars and Locomotives

Numerous original features embodied in design, including system of control similar to that of steam engines, and new method of cooling. Car seats 75.

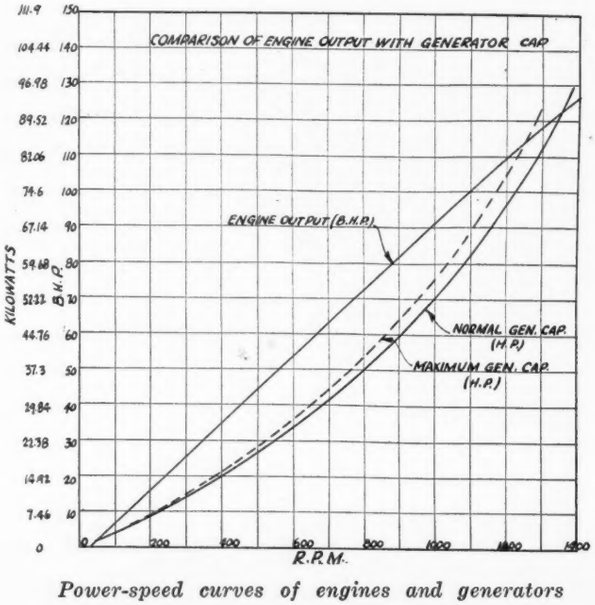
A NEW development in railcar and light locomotive powerplants of the gas-electric type is being announced by the International Motor Co., New York, and will be used on three models of Mack railcars and four models of Mack locomotives. The three railcar models are known as the AS, AQ and AR, and have one, two and three generating sets respectively. The four locomotives will be equipped with from one to four generating units, according to the amount of power desired.

While the powerplant operates on the same general principles as other gas-electric systems, it incorporates numerous interesting original features, chief among which is a system of control which is practically identical with that found in the cabs of steam locomotives.

Another outstanding feature is the cooling system, which is so designed that forced circulation of cooling air is accomplished without drawing on the engine output for operating auxiliary fans. The use of more than a single powerplant in all but the smallest model is also comparatively new; it has the advantage that it makes possible the use of an efficient cylinder size and that it gives added assurance against failure on the road. All powerplants are so installed that they can be readily removed and replaced, and by interchanging powerplants it is unnecessary to take the railcar or locomotive itself out of service when its powerplants require overhauling.

The engine is a six-cylinder one, of 5-in. bore and 6-in. stroke, with a single inlet and exhaust valve and a single spark plug per cylinder. It shows high power for its size and weight, giving 123 hp. at 1350 r.p.m. and 133 hp. at 1500 r.p.m., while in a 48-hour "full out" test it gave 160 hp. at 2100 r.p.m. An engine speed of 1500 r.p.m. is equal to a piston speed of 1500 ft.p.m., which is considered conservative for an engine with the light weight reciprocating parts used by Mack. Aluminum is largely used in the engine to keep down the weight, the crankcase, cylinder heads and pistons being of light metal. The connecting rods are tubular and machined all over. The four-bearing crank-shaft is liberally dimensioned and is case-hardened to 90-scleroscope, the same as in other Mack engines.

It is rather an accomplishment to case-harden a crankshaft of this length, and requires equipment of extraorddinary size for both carburizing



Power-speed curves of engines and generators

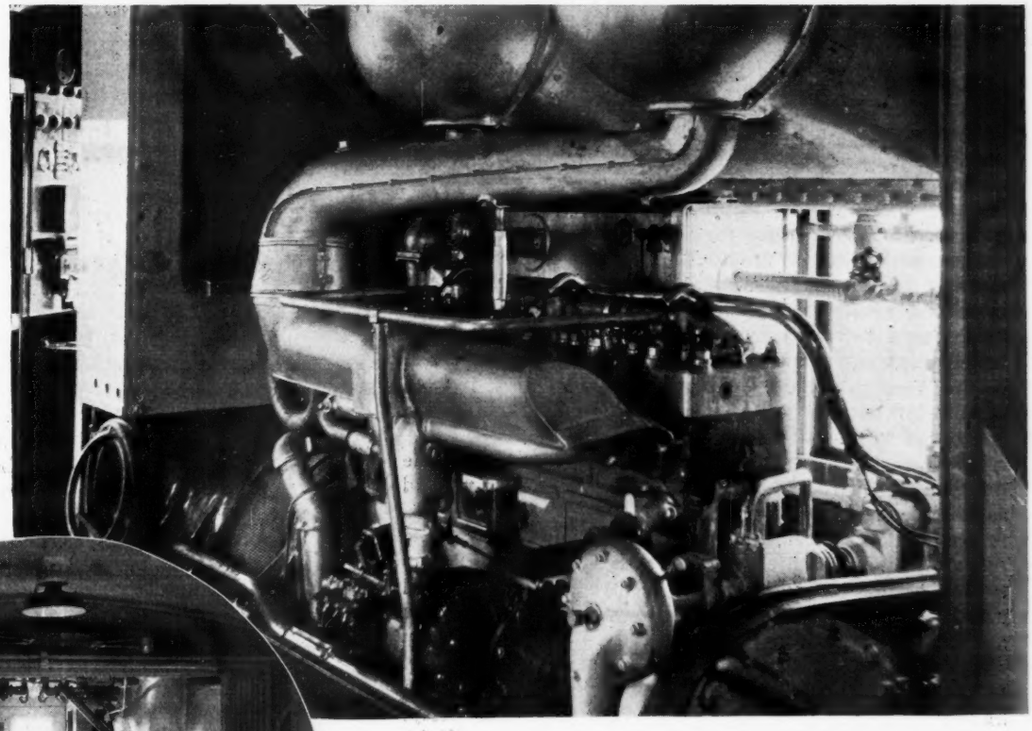
and quenching. After hardening, the bearing portions are ground. The helical gears for driving the camshaft and air compressor have their teeth generator-ground to a final finish after case-hardening.

This engine and its generator are mounted on two 8-in. channels supported by two cast cross-members which also act as pedestals. This base is attached to the car framing through rubber blocks. The base assures alignment between generator and engine. The coupling is made with a Mack rubber torque-insulator. This same base supports all the auxiliaries necessary to complete the powerplant, such as the electric control panel, resistances, cooling water reserve tank, etc.

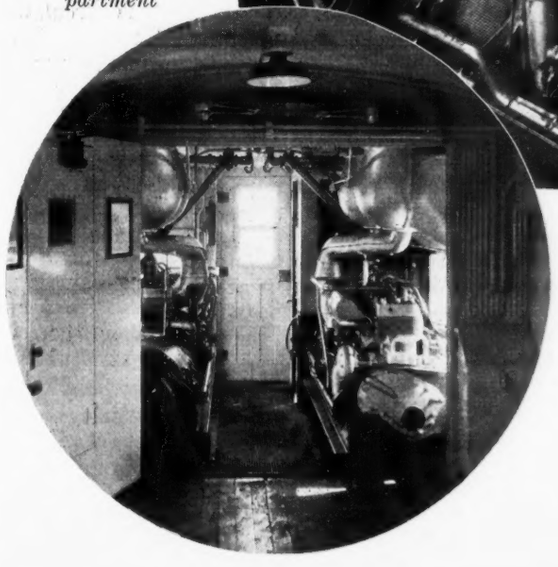
The generator is designed to operate with the Mack engine and is of a capacity to take the full engine horsepower continually under the most unfavorable conditions. It may be of either General Electric or Westinghouse manufacture, at the option of the purchaser. The Westinghouse generator is self-excited and the field automatically maintained at the proper strength by means of a motor-driven face-plate rheostat, the motor being actuated by the engine governor. The General Electric generator is separately excited and the characteristics of the generator and its exciter are such that they tend to keep the engine fully loaded at all times. This is assisted by manual control of the exciter field at low car speeds. Neither generator requires a series connection to the motors but drives its own motor (two in the single-unit car) independently of the other powerplants. These generators are of the four-pole commutating interpole type. The General Electric generator has no rating independent of the engine, but is of the same capacity as the Westinghouse generator, which is rated at 95 kw. Available engine power limits the generator output to 81½ kw. at 1350 r.p.m. and 89 kw. at 1500 r.p.m.

Reason for Larger Generator

There is a special reason for using a generator of larger nominal output than the engine, which is based upon the difference in the characteristics of engine and generator. A curve showing the variation of engine horsepower with speed of revolution is concave toward the base line or axis of speed, indicating that the engine power increases less rapidly than the speed. A similar curve showing the variation of generator capacity with speed is convex to the base line, indicating that generator output increases more rapidly than the speed. Therefore, if the generator capacity were equal to or even somewhat less than the engine output at normal speed, it would be far below the full-throttle engine output at lower speeds. In other words, the generator would not be capable of holding the engine down to lower speeds unless the throttle were partly closed.



Engine-generator set installed in railcar, showing air jacket over exhaust pipe



View in engine compartment

For the sake of fuel economy, smoothness of operation and long engine life, it is desirable to run the engine at the lowest speed at which it will develop the horsepower required to propel the car at the speed desired, and this can only be done if the capacity of the generator at the lower speeds is such that it will absorb practically the whole engine power. The relationships are illustrated in. Fig. 1, in which are shown capacity curves of an engine and of a generator which at normal engine speed would have about 90 per cent the rated capacity of the engine, 10 per cent or so being allowed for generator losses.

It will be seen that at one-half normal speed the gen-

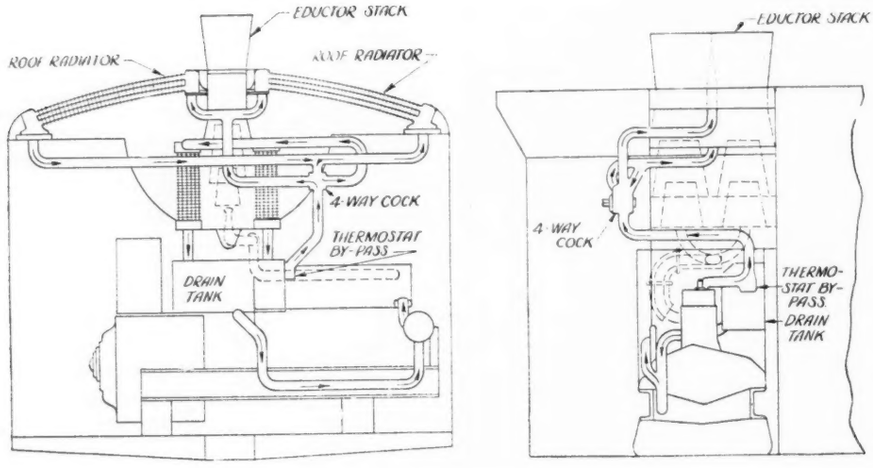


Diagram of the cooling system

erator can absorb little more than half the full output of the engine. By using what might be called an oversize generator, this fault can be corrected and the engine prevented from racing while accelerating. This oversize generator allows the use of reduced engine speed when reduced power is required by throwing the maximum field on the generator and thereby reducing the engine speed and yet retaining the fuel economy of a full open throttle on the engine. This feature, of course, tends to lengthen the life of the engine. This reduced power with economy is accomplished in the same manner as in a steam locomotive, that is by moving the reverse lever toward the central point of its arc of travel.

Battery for Starting

The control has other features which are of interest besides the "link-in" feature just described. Engine starting is accomplished by the master controller throttle handle by connecting the 32-volt car-lighting battery (there is a 150 amp.-hr. battery for each powerplant) to the main generator which motors the engine over. In the Westinghouse generator this same circuit is used to give the battery a high-rate charge when the engine is allowed to idle.

Each engine has an individual cut-out switch on the instrument board, so that the engineer can start and stop any engine without leaving the cab. There are no instruments, but instead there is an indicator light for each engine, which gives a red signal if that particular engine stops, does not cool properly or loses oil pressure. This gives the engineer all the information he needs to operate the car and relieves him of the duty of watching a number of gages. If trouble develops, he will be warned immediately by the flash of the red light for the engine which is not functioning properly. The instrument board has mounted on it a headlight switch and a gang switch for cab lights, an air gage light and a windshield wiper, in addition to the cut-out switch and indicator light for each engine.

Remote control is used for each powerplant, by means of a 10-wire circuit, and, by the use of a multiple wire connector or jumper between cars, the master controller can be mounted in a trailer car, or power cars can be operated as a multiple-unit train, with or without trailers, giving capacity to handle peak loads.

There are some novel features connected with the cooling system. An exhaust ejector is used, which draws air through the radiator and mixes the products of combustion with this air as it is discharged, thus serving the function of a muffler as well as that of a radiator fan. An air jacket surrounds the exhaust pipe and is connected to the low-pressure section of the ejector. The constant flow of air through this jacket cools the exhaust pipe and the exhaust gases, and reduces the danger of burning of fingers while working around the hot engine. Any leakage of gases of combustion at joints in the exhaust pipe is carried away with the air and thus prevented from getting into the car. As a further precaution against the entrance of foul gases into the interior of the car and for crankcase ventilation the engine breather pipe is connected up to the carburetor inlet.

One of the advantages of this system of cooling is that the amount of air forced through the radiator is proportional to the amount of exhaust gas from the engine, so that the cooling effect is automatically regulated. At normal engine speed, 6000 cu. ft. of free air is passed through each pair of ejectors per minute, there being one pair of ejectors for each engine. This permits of the heat absorbed by the cooling water being carried away with a difference of about 70 deg. Fahr. between atmospheric temperature and the temperature of the water entering the radiator. Mixing the exhaust products with air before they leave the car tends to prevent a visible exhaust in cold weather. This mixture of exhaust gases and cooling air is ejected from the car at high velocity, preventing its being sucked into the rear vestibule of the train.

The arrangement of the water circuit of the cooling system is also quite novel. The radiator is in two sections, one being located on the roof and the other at the side of the car above the engine. In addition there is a water tank of considerable capacity mounted on a level with the cylinder jackets and the whole water system is connected up as shown in the diagram. At starting there is no water in either section of the radiator, only the jacket and the tank being filled. As long as the engine is idling, the pump develops only a low pressure, which is incapable of raising the water to the inlet of the roof radiator, so that there is circulation only through the jacket and the tank. This practically eliminates cooling action and results in quick warming up of the engine. Furthermore, comparatively high engine temperatures are maintained as long as the engine is being idled, as both radiator sections are then out of action, or at least become active only if steam is formed, as the pump does not produce sufficient head at these low speeds.

Protected Against High Temperature

The engine is fully protected against excessive temperatures, for the roof radiator section is of sufficient capacity to take care of the heat absorbed by the cooling water. The engine temperature is controlled by a by-pass thermostat which maintains an even temperature of 165 deg. under all loads and weather conditions. A pronounced advantage is that it is not necessary to use non-freezing fluid in winter time, as the radiators, which are the only portions exposed to freezing temperatures, are empty when the engine is standing or idling. The roof radiators can be cut out when desired in ex-

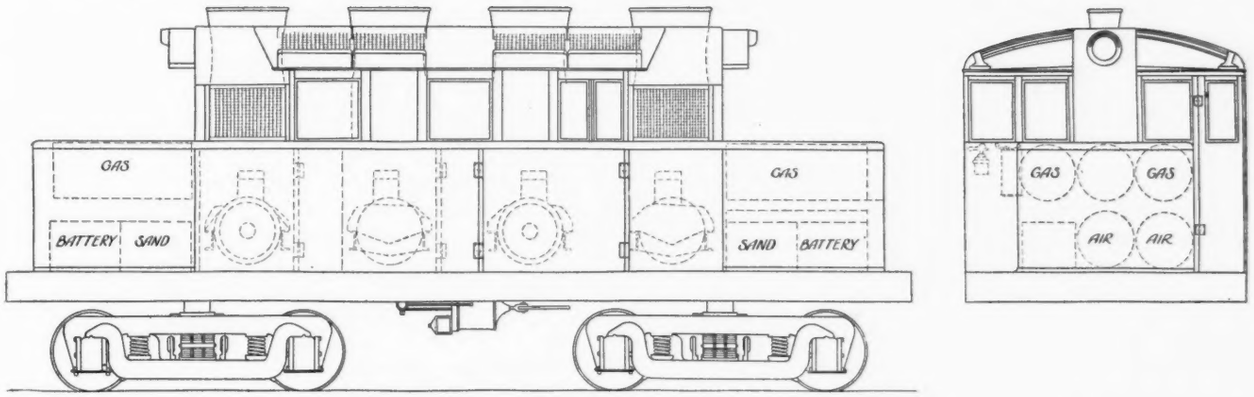


Diagram of Mack locomotive with four generating sets

tremely cold weather by a single cock provided for that purpose. The reserve tank is kept warm over night in cold weather by coils from the car heating system.

The drive of the air compressor involved an interesting engineering problem. The compressor could have been driven either directly from the engine or by a small electric motor deriving its current from the generator. From some points of view the electric drive would be preferable, as the compressor unit need not then be operated continuously but only for a fraction of the time the engine is running, while with direct drive the compressor is running whenever the engine runs. However, owing to the fact that the voltage of the generator varies with the engine speed, whereas operation of the compressor calls for almost constant voltage and the compressor could not be operated at less than three-fourths normal engine speed, the electric drive involves the necessity of keeping the engines up to speed not required for the movement of the car just to insure sufficient air supply, with a consequent waste of fuel from this source as well as from the conversion of the power to electricity. It was, therefore, decided to drive the compressor directly, and it is driven through a helical gear from the camshaft gear, being mounted on the opposite side of this gear from the battery charging generator, which is also driven from the camshaft gear. (The lighting generator is used with the Westinghouse electrical equipment only.)

Long Compressor Life

When the air in the reservoir reaches a certain pressure, a diaphragm in a chamber communicating with the pressure reservoir holds an auxiliary valve open, so that a charge of air is drawn into the cylinder and expelled again without being compressed, during each revolution of the compressor crank. The valve is not allowed to seat again until the pressure in the reservoir has dropped to a certain lower pressure. Thus, although the compressor is running continuously, it is not operating under pressure all the time, and while the continuous operation might be expected to have an effect on the life of the compressor, there is no difficulty in getting it to stand up, as it has only one-half the stroke of the engine. Its bearings are purposely made somewhat larger than are usually found in intermittently running compressors of equal capacity.

The compressor is a two-cylinder one and has a capacity of 12 cu. ft. of free air per minute at normal speed. In cars having multiple power plants there is one compressor on each engine. In fact, each of the powerplants is complete in itself and independent of the other and its accessories. The compressor is fitted with an air-cleaner, in accordance with the usual practice.

The lubrication system of the compressor is tied up with that of the engine, in that lubricant is furnished from the engine crankcase. The compressor, however, has an oil circulating pump of its own.

Battery charging is handled differently with the different electrical equipments. In either cas. its control is included in the powerplant control and requires no additional car-lighting regulator. The General Electric equipment charges the battery from the exciting generator and can be set for any desired rate of charge found necessary for the service in which the car is operating. Charging takes place when the engine is moving the car. The Westinghouse electrical equipment charges the battery at a high rate when the engine is idling. This circuit is automatically opened when the engine is speeded up by a voltage-operated relay. Charging is also accomplished by a lighting generator, driven from the engine camshaft gear. This generator is designed with a flat voltage curve and requires no regulation. It is cut in and out by a reverse current relay. The rate of charge can be adjusted to the service in which the car is operating. This insures a battery charge either at high engine speed or when the engine is idling.

The motors are conventional. The single unit car has two motors of either 65 hp. each or 100 hp. each, depending upon the service required of the car. The double and triple unit cars have motors of 150 hp. each. The locomotives are equipped with heavy duty motors of ratings higher than those used in the railcars.

One of the most interesting features of the new car is the control, which is so arranged that it operates almost exactly the same as the standard control gear in a locomotive cab. Under present railroad conditions it is especially the older locomotive engineers who are drawn upon to operate railcars, and these men naturally dislike to learn their work all over. It was therefore decided to duplicate locomotive control. There are three levers in all. One of these is the air brake lever, which the engineer manipulates with his right hand. There are two levers which are manipulated with the left hand. The first of these, known as the control lever, corresponds to the throttle lever of the locomotive, while the other, known as the reverse lever, corresponds to the lever controlling the link motion of the locomotive.

When the operator wants to start the engines, he has the cut out switch turned on for the engines he is going to use. He then inserts the removable reverser handle and places it in the start position, which unlocks the master controller. He moves the control lever to the

first notch, which starts the engines, and when started this becomes the notch on which the engines are allowed to idle. The succeeding positions of the control handle speed up the engine with the circuit open to the motors until the reverse handle is moved to a running position. This can only be done by returning the control handle to idle or off.

It may be desirable to speed up the engines, as explained above, to warm up the engines at the beginning of the day, or to pump air more rapidly than is possible with the engines idling. When it is desired to move the car, the reverse handle is pushed to the forward position to move ahead (the other extreme to reverse). The control handle is then pulled back, notch by notch, until open, which gives the car full power. The generator field adjusts itself automatically as the car speed increases, and when the car has attained the necessary speed the motor is shunted automatically. If reduced power is required, the reverser handle is moved toward its neutral position, as is done with the steam locomotive, except that in this case it reduces the engine speed by means of an excess generator field and gives reduced power at high fuel economy. If a further reduction in power is required, the control handle can be partly closed, which will partly close the engine throttle.

When the engineer wishes to stop the car, he returns the control lever to the idle position, or by slight additional pressure to the off position if he desires to stop the engines. He then applies the brakes as required. If he has "linked in" with the reverse and fails to push it out again before starting, he will be immediately reminded of this by the reduced acceleration of the car.

The car body and trucks will be built to meet the railroad specifications. The car illustrated is 74 ft. in length and accommodates 75 passengers, in addition to which it has a baggage room 15 ft. long. It is provided with two toilets with wash basins. It is designed either to operate singly or to haul a trailer. The trucks are of cast steel with clasp brakes. The car weighs 105,000 lb. light.

One of the features of the car is its fire-proof construction, the only wood in it being the removable floor in the baggage compartment. The window sashes are of brass. Automotive type seats are fitted.

Books for the Business Bookshelf

Industrial Safety Work

The Manual of Industrial Safety. Sidney J. Williams. A. W. Shaw Co., Chicago. 197 pp. $2.50.

ALTHOUGH the promotion of safety in industrial plants has been actively carried on for a number of years, very little information has been made available, in permanent form at least, regarding the plans and methods which might be employed effectively to reduce accidents. This book should be very welcome to safety engineers and industrial executives since it provides a rather comprehensive study of modern safety methods. Organization of a safety department and securing cooperation between it and the workers occupies an important place in successful safety plans, and these subjects are stressed by Mr. Williams. Another valuable section contains practical suggestions for safeguarding various types of equipment and tools found in industrial plants.

Business in New England

The New England Economic Situation. Edited by Edwin F. Gay and Allyn A. Young. A. W. Shaw Co., Chicago. 260 pp. $2.50.

THIS interesting book contains the contributions of 10 Harvard seniors, each of whom has written a paper on a particular phase of the New England economic situation. Various subjects are covered but the chapter of most automotive interest is the paper on the causes of the decline of the automobile industry in New England. The lack of wholehearted financial support to the infant industry is cited as the outstanding reason why the Middle West won it from New England.

Metallurgy of Iron and Steel

An Introduction to the Metallurgy of Iron and Steel. H. M. Boylston. John Wiley & Sons, New York. 571 pp. $5.

THE title of this book very fairly indicates its contents. It is intended to give the student, the iron and steel worker, the engineer or other interested persons a fairly comprehensive view of the fundamentals involved in the manufacture and properties of various types of ferrous products. Profusely illustrated, the book conveys to the reader a very clear idea of the processes involved in the manufacture of pig iron, castings, wrought iron, Bessemer, open hearth and electric furnace steels, commercially pure iron and ingots. Other chapters discuss the mechanical treatment of steel, the composition, structure and physical properties of iron and steel, heat treatment, raw materials of the iron industry, etc.

Business and Happiness

How to Get the Most Out of Business. B. C. Forbes. B. C. Forbes Publishing Co., New York. 248 pp.

HAPPINESS" is Mr. Forbes' "most" in this instance, although one may assume that financial success is the best if not the only way to acquire happiness since all the many examples cited throughout the book of how certain individuals have, apparently, got the "most" out of their business refer to persons whose income tax returns always make news. The list of persons who have contributed indirectly to the book run all through the alphabet from George F. Baker to Owen D. Young, and one is hard pressed to think of a captain of industry who has not discussed life and its purpose with Mr. Forbes. Of course, it is just another "success" book, but for those who feel the need of inspiration in their activities it should be helpful, for there is little doubt of Mr. Forbes' position as one of our leading contemporary inspirers.

Establishing Credit Ratings

Bank Loans on Statement and Character. Mahlon D. Miller. Ronald Press Co., New York. 492 pp. $6.00.

IN considerable detail the author covers the various means of establishing credit ratings. Although ostensibly addressed mainly to bankers, the volume should be of great use to credit men of manufacturing concerns. Numerous chapters on business control round out the picture of analysis of corporate standing.

Industry *Against* Current Attempt to Establish *Toll Roads*

Idea seen as hindrance to general highway development. Would be step backward in national progress, says Reeves.

By Norman G. Shidle

TOLL roads in the United States have been going the way of the horse car for many years. Slowly but surely the old toll roads, established back in the days before even the first horseless carriages were getting much attention, have been coming into the hands of State highway authorities and being made free to the public. This trend has had the approval of the Bureau of Roads of the Department of Agriculture, the agency which, with the cooperation of the various State highway departments, has been most potent in making possible the good roads system of our country.

While there is little likelihood of any marked change in this trend toward final complete elimination of the toll road, enough recent agitation has taken place to make necessary some real attention to the subject on the part of automotive executives, distributors and dealers. Any important recrudescence of the toll road idea would tend to hinder general highway development, complicate the work of coordinating highways systems and impose another burden on the already constantly increasing cost of owning and operating a motor vehicle.

"To revert to toll roads would be a step backward in national progress for which there is no reason or excuse," said Alfred Reeves, general manager, National Automobile Chamber of Commerce, in a public statement recently—and in that stand Mr. Reeves seems to have the backing of most students of highway problems as well as of automotive men as a body.

A number of proposals for new toll roads, nevertheless, are being made directly or indirectly today. On the surface, some of them seem to have certain advantages from the standpoint of the car owner and of the automotive industry. Closer examination of fundamentals, however, brings to light numerous objections which far outweigh the possible advantages.

Public Support Needed

The highway system of the United States is an achievement of such magnitude and such fundamental public importance that it never could have been developed by private interests; public support and public cooperation are essential to its continued progress along constructive lines. And since the benefits of the highways accrue to the public as well as to the motorists it is fair that the public should bear the major cost of building the roads. In most States at the present time the motor vehicle is paying sufficient special taxes to care for the maintenance and a part of the construction of all the highways that are at present needed.

The installation of a toll road in one section is likely to make some taxpayers in adjoining areas say: "Why should we pay taxes for building highways here when tolls are being collected to pay for them next door?" Thus the progress of the national roadbuilding program over a period of time might be seriously handicapped. The answer to the question just asked, of course, is that private capital never could take care of the real highway needs.

Then, too, there is the matter of profitability of toll roads. In this respect, the situation is different from that as regards toll bridges. While toll bridges have proved immensely profitable, it is highly unlikely, according to experts, that toll roads can be made profitable. Even on much traveled routes between centers of populations, surveys indicate that a large proportion of the traffic is local in character; this local traffic would not be likely to use the toll road. The remaining through traffic, students say, would not pay for the cost of building and maintaining the highway.

A Risk for Investors

The difficulty here, of course, is the danger of investors becoming too enthusiastic about profit possibilities before going into the matter thoroughly. The profit in such cases would be likely to accrue more to the original promoters of the idea than to those who permanently held the securities with which the road was financed.

The whole matter of toll roads lately seems to be getting mixed up with that of express highways. Proposals being made in Congress for investigation of the feasibility of construction of express highways have been interpreted by some automotive representatives as an entering wedge for the establishment of toll highways. The sponsors of the legislation in Congress disavow any such idea, but there can be little doubt that in the minds of some representatives supporting the investigation idea is the thought of toll roads as at least one possible alternative method of financing.

The attitude of the automotive industry on this important question is fairly well summarized in the words of H. H. Rice, chairman of the N.A.C.C. tax committee, when he says:

"The free use of the public highway is a fundamental principle of government.

"Motor vehicle owners of the United States through special taxes are today largely meeting the costs of the construction of these highways.

"So-called express highways are simply a step in the further improvement of our public highway system which will be found necessary in those localities where traffic is heavy and congestion great.

"The National Automobile Chamber of Commerce, therefore, opposes any effort to place control of any part of the public highways in the hands of private promoters, and this body emphatically supports the principle that the public highways shall be kept forever free to the general public."

High Road Speed Featured in New Six-Cylinder Trucks

Federal, Autocar and Pierce-Arrow design new fast service models. Studebaker Adds ½-ton delivery car.

A HIGH-SPEED "Fleet-Arrow Wagon," capable of transporting loads up to 2 tons at passenger car speeds, was announced by the Pierce-Arrow Motor Car Co., Buffalo, N. Y., some months ago. Details have now been made public. It is made in three lengths of wheelbase, of 140, 160 and 180 in. respectively.

The engine is a six-cylinder one, with a bore of 3½ and a stroke of 5 in., and is governed to run at 2500 r.p.m. With the standard gear ratio and 34-in. driving wheels this engine speed corresponds to a car speed of between 47 and 48 m.p.h. A feature of the engine, which is of the L-head type, is that the cylinder head is made of cast aluminum, which permits of using a somewhat higher compression pressure than would otherwise be possible. The cylinder bores are ground and honed. The crankcase is made of two aluminum alloy castings, the upper part extending down some distance below the crankshaft axis to give additional rigidity. The flywheel housing is cast integral with the crankcase. A separate oil pan, also of cast aluminum, is used, and is provided with cooling fins on its under side. The oil pump is located in the crankcase and is readily removed for cleaning.

The seven-bearing crankshaft is machined all over; its main bearings are 2⅝ in. in diameter, while the crankpin bearings are considerably smaller, their diameter being 2⅛ in. This plan of making the crankpins smaller in diameter than the main bearings tends to raise the critical speed of torsional vibration and to eliminate trouble from this source.

Lubrication is by force feed to main and crankpin bearings, the oil being cleaned by means of a filter mounted on the forward side of the dashboard. Cooling water is circulated by the usual centrifugal pump, which is positively driven. The fan is a four-bladed one and is mounted on adjustable ball bearings; its drive is by V-belt and the belt tension can be adjusted by means of an eccentric.

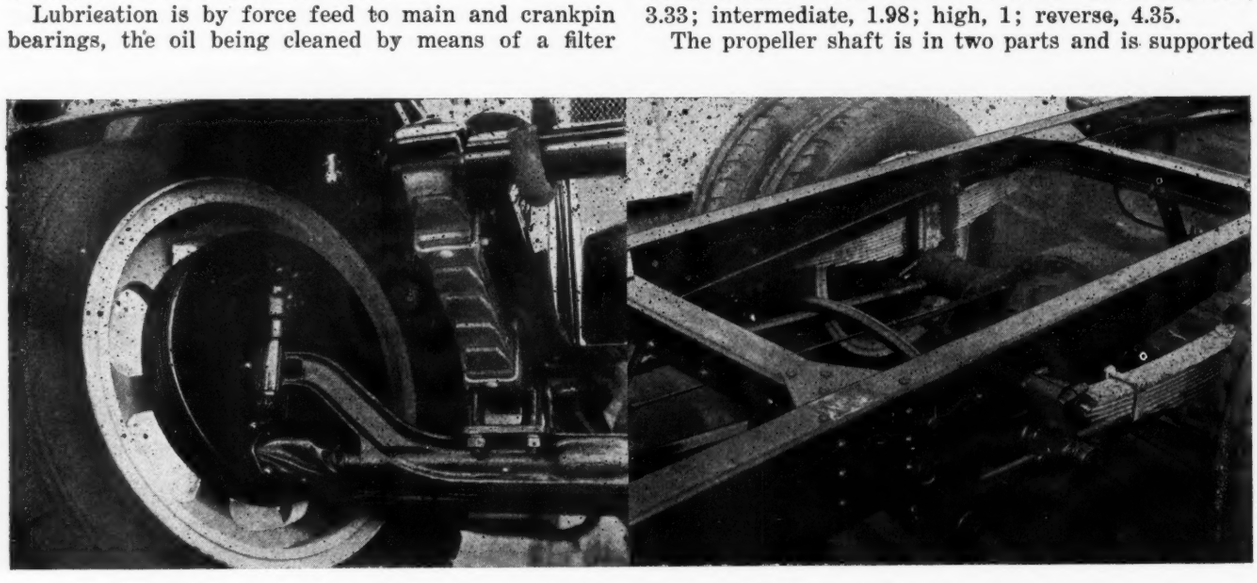
A Stromberg carburetor with special features is employed. One of the features is thermostatic control of the mixture, permitting of the use of a richer mixture for acceleration when the engine is cold.

The entire electrical system with the exception of the battery is of Delco make. The generator is driven through a flexible coupling and the starter is positively engaged by means of a pedal. A 6-volt, 111 amp.-hr. battery with rubber case is furnished. The ignition unit is combined with the generator and is of the type having both automatic and manual control. A conduit on the cylinder head protects the high tension cables against mechanical injury.

Single Plate Clutch

The clutch is a single-plate type with adjustment for wear. The transmission has three forward speeds and one reverse. Its gears are case-hardened and ground, and the shafts are supported on ball bearings. The shift lever and emergency brake lever are mounted on the transmission case, as in passenger car practice. A power take-off opening in accordance with the S.A.E. standard is provided in the left side of the housing. Transmission ratios are as follows: First forward, 3.33; intermediate, 1.98; high, 1; reverse, 4.35.

The propeller shaft is in two parts and is supported



Left—Front axle end of Pierce truck. Right—Rear end of Pierce truck chassis showing deep frame section heavy shackles and tubular radius rods

in a heavy, self-aligning ball bearing mounted on a pressed steel cross member of the frame. This bearing is lubricated through a fitting at the side of the frame. Metal universal joints with oil-tight castings are used.

Bevel gear final drive is employed, and the rear axle is of the full-floating type, with a pressed steel housing. The standard reduction ratio is 5 2/7 while a special reduction ratio of 6 3/7 can be furnished, from which ratios it may be surmised that the pinion has seven teeth and the gear either 37 or 45. The faces of the bevel gears are 1 11/16 in. long. The pinion shaft is straddle-mounted on Timken and Hyatt bearings, while Timken bearings are used in the wheels and at the differential. All gears are made of chrome-vanadium steel with case-hardened teeth, while the axle shafts are made of chrome nickel steel and are 1⅝ in. in diameter. In accordance with long-established Pierce-Arrow practice, the driving thrust is taken up on radius rods. These are tubular in form, 1 13/16 in. in diameter, and provided at both ends with adjustable ball sockets, by which they connect to case-hardened, removable ball pins on both the frame and the axle, the pins having tapered shanks. Springs are incorporated in these ball and socket joints to prevent rattle.

Wheel equipment consists of cast-steel wheels with integral hubs, six hollow spokes and 20-in. rims. Rims are interchangeable between front and rear wheels. Standard tire equipment consists of single 32 by 6 in. pneumatics in front and single 34 by 7 in. pneumatics in the rear. At extra cost 32 by 6 in. dual pneumatics can be furnished for the rear.

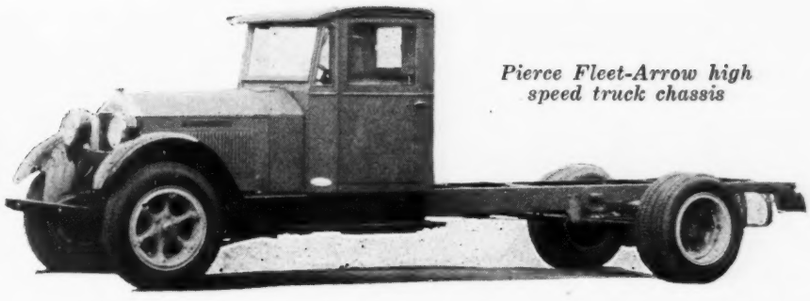
The braking equipment includes two complete and independent systems. Four-wheel brakes with mechanical operation are used as service brakes and in addition there is a transmission brake which is applied by a hand lever. The drums on the four wheels are made from forgings of high carbon steel, machined all over and provided with air-cooling fins on the outside. These brakes are of the expanding type. The front wheel brake drums are 14 in. in diameter and take shoes 2¼ in. wide; the rear wheel drums are 15 7/16 in. in diameter and take shoes 2¾ in. wide. Together the two brakes give a braking area of 614.75 sq. in. The force of application is equalized between the two sides and divided in the proportion of 40 to 60 between the front and rear.

Transmission Brake

In addition to the four-wheel brakes there is a transmission brake which is of the contracting type. The linkage for this brake is quite simple and adjustment is required only to compensate for the wear of facings.

The front axle has steering heads of the reverse Elliott type. All of its members are heat-treated chrome-nickel steel forgings. The tie-rod has ball joints with dust covers. Timken bearings are used in the front wheel hubs. Houdaille hydraulic shock absorbers control the action of the front springs. No shock absorbers are said to be required at the rear because of the long springs used.

Front springs are 38 in. long by 2 in. wide; rear springs, 56 in. long by 2½ in. wide. All springs are made of silico-manganese steel. Spring eyes are fitted with bronze bushings, those in the front springs having a bore of ¾ in. and those in the rear springs, of 1 in.



Pierce Fleet-Arrow high speed truck chassis

Shackle pins are hardened and ground. The rear springs are secured to the axle by heat-treated nickel steel clips.

The steering gear is of the hour-glass worm, ball-bearing-roller type and is provided with means of adjustment for wear. The frame is a pressed steel construction with channel side members having a maximum depth of 7⅝ in. and flanges 4 in. wide and made of 3/16 in. stock. Chassis lubrication is by high pressure oil gun.

A bumper made of channel section pressed steel with a heavy bumper spring is mounted on the front of the frame. Other items of the standard equipment are as follows: An engine governor, generator and starting motor, ammeter, oil gage, light and ignition switch, dash lamp, speedometer, electric head lamps between fenders, electric tail lamp and horn, front and rear license brackets, front fenders, half length running boards and aprons, tire carrier at rear of frame, spare rim, tools, tool box and jack.

Chassis weights are as follows: With 140-in. wheelbase, 3796 lb.; with 160-in. wheelbase, 3928 lb.; with 180-in. wheelbase, 4060 lb. These weights include the full equipment and full supplies of fuel, water and oil. as well as a spare rim and the 34 by 7 in. tires.

High-Speed Autocar

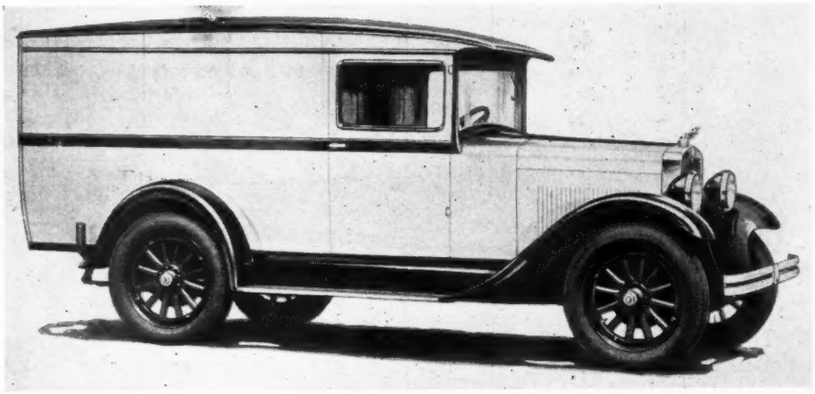
AUTOCAR CO. has announced a new 2½-ton, six-cylinder truck model for high speed, long-distance work. Designated as Model T, it is powered by a 4¼ by 4¾ in. engine mounted in the conventional manner and featured by a dual range transmission.

Engine lubrication is by pressure feed with a gear pump inside the crankcase. Carburetion is through a special truck type plain tube carburetor equipped with air cleaner and fed by vacuum from a 31-gal. tank. A hot-spotted Swan manifold is used. The cooling system includes a fin-tube type radiator, centrifugal water pump and fan.

The engine, two-plate clutch and transmission are mounted in unit. The dual range transmission, which provides a further reduction of 1.78, however, is mounted back of the regular transmission. The auxiliary transmission together with the regular four-speed transmission provides a range of eight speeds.

Service brakes are internal operating on the rear wheels and provide a total braking area of 328 in. The hand brake operates on the propeller shaft. The steering gear is of the cam and lever, semi-irreversible type. Final drive is through a full-floating double reduction, bevel and spur gear rear axle. Wheel and axle bearings are Timken.

The frame is of pressed chrome nickel steel tapered at both ends and of 9 in. depth, 3-in. flange and ¼ in.



½-ton delivery car added to Studebaker line

thickness. Semi-elliptic, silico-manganese steel springs with auxiliary springs in the rear support the frame. Pneumatics with dual rears are standard, being 34 by 7 in. all around. The wheelbase is 213 in.; front tread, 65 in.; distance back of seat to end of frame, 17 ft.; overall length, 25 ft. 9 in.; overall width to outside hub of rear wheels, 82¼ in. The chassis is designed to carry bodies up to 18 ft.

Studebaker Delivery Model

ANNOUNCEMENT has been made of the addition of a new ½ ton delivery car to its line by the Studebaker Corp. It is offered in two body styles, a screen body listing at $795 and a panel delivery priced at $820. The new delivery units are mounted on the chassis of the American edition of the Erskine Six. In mechanical design the delivery units of course follow closely that of the Erskine. Loading space, from the driver's seat to the rear door, is 74 in. while the width is 48 in. and height 47½ in., giving a total loading capacity of 96.5 cu. ft. The rear opening is 44 in. wide and 40 in. high, while the top of the platform is only 28 in. from the ground. This low platform height is obtained by a special sub-frame construction while the floor is sealed from dust or moisture by "J" shaped iron joints.

Following the modern trend in delivery cars, the bodies are attractively finished with wide belt molding extending the length of the body from the dash back. Standard equipment includes automatic windshield wiper, dome light, rear view mirror, Hydrostatic gasoline gage, and coincidental steering and ignition lock.

2-Ton Federal "Six"

A NEW 1½ to 2 ton model known as the A6 is being offered by the Federal Motor Truck Co. Basic in the design is a higher road speed at full safety, made essential by growing highway congestion. From this angle, the truck is equipped with a six-cylinder, seven-bearing crankshaft Continental engine developing 67 hp. at 2700 r.p.m. A four-speed transmission is mounted amidships while bevel gear drive is used for the rear axle.

In order to provide safety at the increased top speed possible with a heavy truck, hydraulic four-wheel brakes are standard, supplemented by an internal expanding propeller shaft brake with the expanding shoe mounted on the rear of the transmission case, and the drum mounted over the first metal universal.

The Continental 16C engine used in this truck has a bore and stroke of 3⅜ by 4⅝ in. giving it an S.A.E. rating of 27.34 hp. and a piston displacement of 248.25 cu. in. It is of the L-head type, with the upper crankcase half integral with the cylinder block. Lubrication is by pressure to main, crankpin and camshaft bearings and timing gear case, the pump being located in the sump. The water pump is located at side and rear of the block, which with the water outlet at the front end should insure adequate water circulation throughout the engine.

Full electrical system is carried, including starter, generator, horn, head, tail and instrument board lights. The clutch is inclosed in the bell housing and is of the single plate type, carrying two 12-in. asbestos fabric rings. Between it and the transmission is a fabric universal joint. Location of the transmission has been worked out so that it can be quickly dropped out of the frame if necessary. To this end it is located back of the cab and is supported by four bolts from two frame cross-members, the two front bolts holding a trunnion mounting. By removing these bolts, and disconnecting the gearshift links at the front of the case, the entire assembly can be dropped. Back of the transmission are two metal universal joints.

Reduction for the bevel gear drive rear axle is 6⅜ to 1 standard, with optional ratios of 5.66 and 5.00 to 1. Straddle mounting is used for the pinion, with a double row ball bearing at the front and a single ball bearing at the rear. Differential is carried on Timken taper rollers.

Cam and lever steering gear is employed, the gear case being riveted to the frame in a bracket, with the linkage passing below the side rail. The Lockheed hydraulic four-wheel brakes are of the internal expanding type and the system includes the submerged master cylinder with automatic compensating action. Drums are 16 in. in diameter and take 2¼ in. lining.

Heavy duty pneumatic tires, 32 by 6 in front and 34 by 7 in the rear, are furnished as standard equipment, with dual 32 by 6 in. rear tires optional. These are all mounted on 20 in. base steel-spoked wheels, an extra rim being furnished. Chassis lubrication is by grease gun.

It is interesting to note the precautions which have been taken against failure of the copper oil lines for the braking system. Where these pass through cross-member brackets in the side rail they are supported in rubber bushings, while at the front and rear connections to brakes themselves are made through the use of pipe fittings screwed into the lower side member flange, to which the piping is screwed above and below. Pipe lines extending over the rear axle, moreover, are steel-clad to protect them from injury.

Chrome plating is used to finish the radiator shell. The cowl is of the passenger car type, but is separately bolted to the dash and cab. Fenders are of the full crown type, and a pressed steel bumper is bolted to the front spring horns. The truck is available in either 151 in. (standard) or 163 in. wheelbase.

Just Among Ourselves

Keeping the Maximum Number Employed

TALKING about labor relations—which a number of executives are these days—it is the opinion of one experienced production man that about the most important factor in providing sound labor conditions so far as the automotive industry is concerned is that of stability of employment. Not only are wide variations in working force expensive from the labor turnover standpoint, he urges, but also they are socially unjust and tend to breed more unrest than any other single item. Some help along this line is necessary, of course, from the sales department, but the manufacturing department within itself can influence materially the situation by cutting hours and days of work rather than fluctuating the number of men in many instances. A number of automotive plants, according to this executive, who is very close to the entire situation, are making definite and reasonably successful efforts to provide continuous employment for a large proportion of their steady workers; a few, he states, however, are not taking the interest in this matter which the industry as a whole might reasonably expect.

* * *

Little Companies of Long Ago

JUST got a letter from a man who has followed the comings and goings of automobile companies since the beginning of the industry more accurately and more closely than anybody we know. Commenting on some recently published historical studies of the development of the industry he decries the lack of importance the younger historians tend to give to the many small and now forgotten companies which really formed the groundwork for the great organizations which constitute the industry today. Maybe there's a bit of sentimentality in his thought, but a good many old-timers at least probably will support his contention on economic grounds as well. "The small producers may not figure dramatically, in the picture," the letter runs, "but they have had their influence; their entrances and exits have had a marked psychological effect; their small outputs served to create interest in the automobile in the early days and, when sold locally, doubtless gave competition to those who sold nationally."

* * *

Much of History Made by Them

THE early days of the industry," the letter continues, "cannot be viewed fairly if only present-day eyes are used; to neglect the producer of 500 cars as a factor in 1909 is as serious an error as to neglect the producer of 20,000 cars today. * * * In fine, the history of the automobile industry is not General Motors, Ford and 180 lesser lights, but the whole gamut; the summation of all the little fellows who risked their money and that of their neighbors to blossom and then fail paints the only true picture of the background from which the modern giants have sprung." Certainly the present generation of automotive men as a whole will join the old timers in echoing s i n c e r e l y the cry, "Hail! the pioneer."

* * *

Truck Shipping Facilities Needed

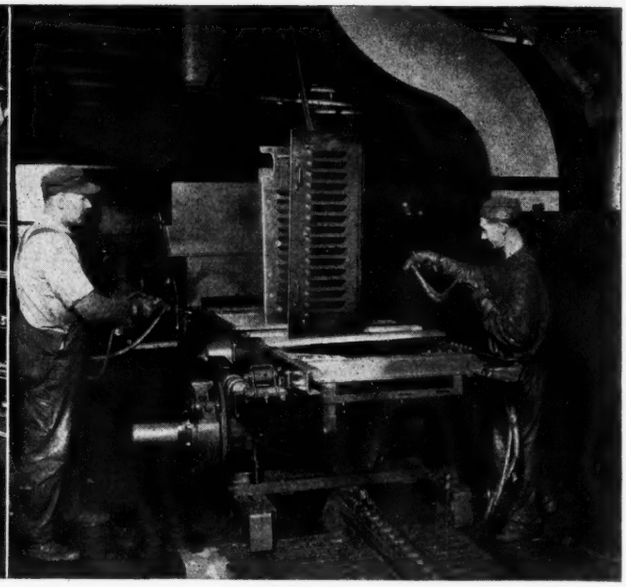
WHAT a whale of a new market for motor trucks would be opened up if every new manufacturing plant built were to be so constructed as to provide equal facilities for receiving and shipping material by railroad and by motor truck. It is now generally admitted that the motor truck has an advantage over the railroad for hauling certain types of materials over limited mileages. And yet the number of plants—even modern ones—which are so built as to provide adequate facilities for receiving and handling t r u c k e d materials similar to those provided for handling rail shipments is infinitesimal. An outstanding example of a plant whose constructors took forethought on this important item is the new G.M.C. truck plant at Pontiac. It is rather fitting and proper, at that, to have a truck manufacturing plant lead the way.

* * *

He Doesn't Worry About Jumpy Schedules

ONE parts company executive, interestingly enough, has discovered a silver lining to the cloud of jumpy release schedules f r o m customers. "The jumpier the schedules are," he propounds, "the better opportunity it gives us to prove our contention that we can do a better job, provide better service and more capably meet contingencies than can our competitors. If everything went smoothly, we wouldn't have a chance to show the other fellow up." There's some good sound sense to that attitude so far as getting the job done is concerned. While the argument may have in it certain holes so far as the logician is concerned, it provides a good deal sounder approach as a practical philosophy than does the more common tendency merely to fret more and more as fluctuations continue year after year and month after month.—N.G.S.

Part of chassis assembly line showing engine being placed in chassis



Spray painting station is directly after the cleaning station

Truck Production is *Facilitated by* Progressive Assembly

White Motor Co. adopts system whereby factory works on only one model at a time. Makes possible better control of material and effects economy in floor space.

THE factory of the White Motor Co. has adopted a new system of erecting trucks and buses which is designed to facilitate production, promote better working conditions and workmanship and insure the erection of the customer's chassis by the scheduled erection date.

Under the new system one model is built at a time instead of all models together as in the past. For example, the week's requirements for the Model 15-B are built on Monday and Tuesday mornings, and beginning with Tuesday afternoon the erection of Model 20-A's is begun. This group of models caused an adjustment to be made in the schedules of the machining departments, as the completed units and parts must reach the erection floor in the proper sequence.

These changes have enabled the factory to adopt the progressive method of frame and chassis assembly. This method is used wherever possible because it aids in the control and handling of material, reduces floor space and obtains higher efficiency with no extra expenditure of effort. The chassis pass through a series of definite operations, each of which requires the same length of time to perform. A chain conveyor guides them to these various operations without effort on the part of the assemblers, thus permitting them to devote their entire time to the correct assembly of the product.

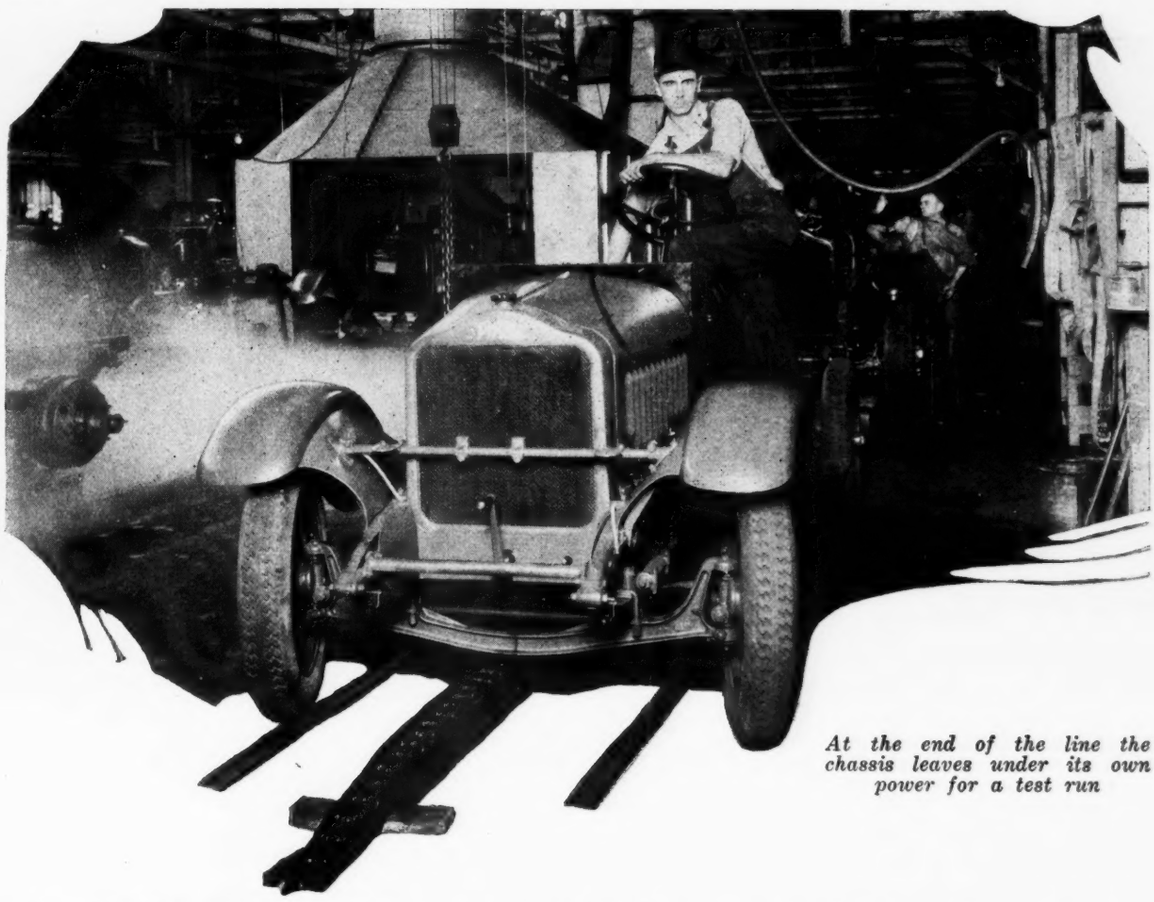
Frames are taken from storage and placed upon the conveyor assembly line. The purpose of the latter is to keep material off the floor, to aid the workmen in moving frames between operations and to insure a higher degree of quality. Not only does such a system allow the workmen to devote more time to better workmanship, but it actually insures a definite sequence of operations.

Laying Out the Frame

The first major operation is that of laying out the frame, or determining the exact location of every hole that must be drilled. For this purpose there are large layout fixtures suspended over the line which, when lowered onto the frame, enable the workman to indicate the correct position of every hole. This method enables the company to duplicate any frame in service, thus assuring the customer of interchangeability.

The frame is then moved forward to the next operation—drilling. Here it is worth noting that all holes in White frames are drilled instead of being made according to the common practice of punching. This results in avoiding the usual strains that are set up in the metal by the punching process.

The frame is now ready for the actual assembly of its component parts. Brackets, hangers and other items are bolted on tightly and checked for alignment,



At the end of the line the chassis leaves under its own power for a test run

ready for riveting. Electric rivet heaters, located handily to the riveters, heat rivets in a scientific manner. They heat the rivet from the inside to the outside, insuring one that will remain red until it is driven, and also one free from scale.

When all riveting has been performed, the frame is ready to be transferred to the chassis assembly line, where later it will pass from the end of the line in a completely assembled chassis.

That, in a few words, is the system by which all light truck and bus frames are assembled. In the case of heavy duty frames, the production process is more comprehensive, as the company builds the frame completely, from the assembly of the side and cross-members to the riveting on of component parts. The reason for this is that it was not possible otherwise to obtain the high standard of quality required.

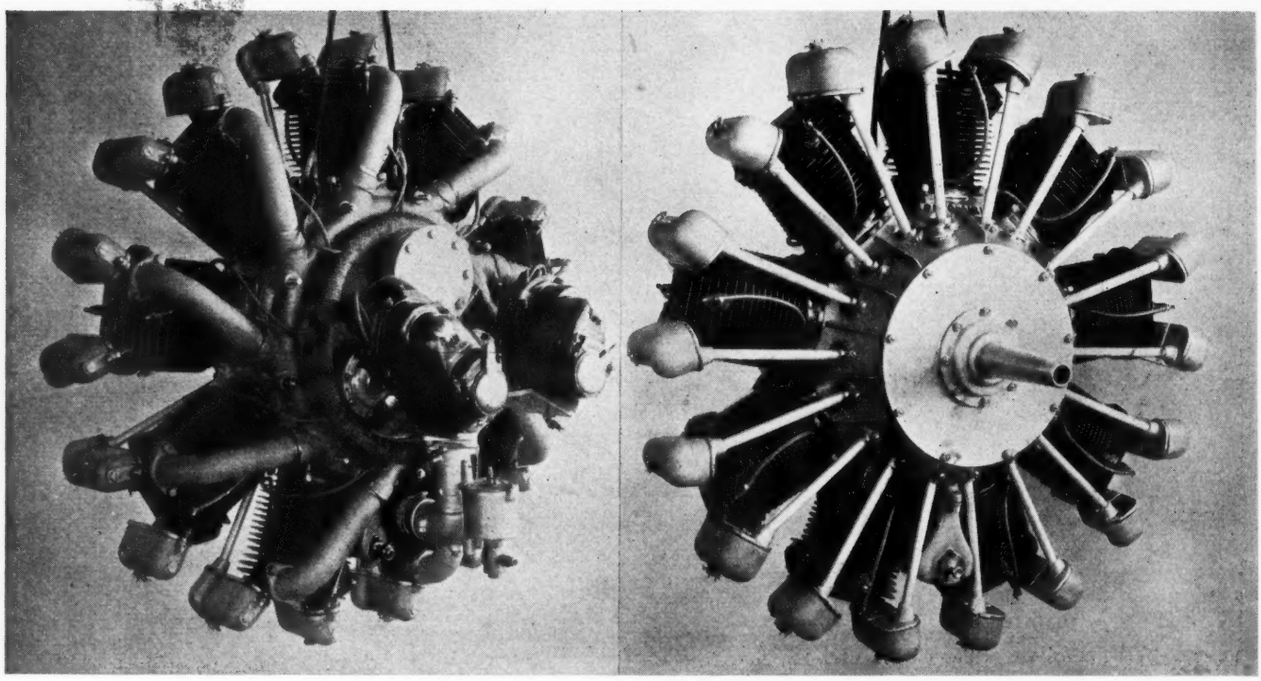
The assembly line is divided into three main parts, each one having a well defined function. Springs and axles are bolted to the frame at the beginning of the line. As the chassis moves on, the steering stem, engine, radiator and dash are all assembled into their places. It is then transferred to the second line which takes it through the cleaning booth, from there to the paint spraying booth. The latter is so constructed that a blower system creates a suction of air through floor gratings so that all excess spray is drawn down and out. This feature was incorporated solely for the purpose of making working conditions more pleasant.

After painting, the chassis passes through the long drying oven, where it takes an hour and 20 minutes to pass from end to end, so that every part becomes thoroughly dry in a few minutes after leaving the oven. The beginning of the third line is then reached. This takes the truck or bus through the various stages of installing electrical equipment, hood and fenders, greasing and fueling.

At the end of the line a man drives it away for test. Other inspections take place before shipment.

THE German commercial vehicle manufacturing firm of H. Buessing Co., in Brunswick, recently celebrated the twenty-fifth anniversary of its foundation and on that occasion issued a luxuriously printed, profusely illustrated volume giving a history of its development and describing and illustrating its present and earlier products. H. Buessing Co. is one of the very few firms throughout the world that have manufactured commercial motor vehicles continuously for a quarter century. Its products always have borne a good name and the volume referred to is in some ways a history of motor truck and bus development from the earliest crude designs to the modern six-wheeled, six-cylinder, pneumatic-tired, low-frame safety-bus.

IN a French consular report dealing with the electrical industry in Italy, it is stated that the development of the automobile industry naturally gave rise to a great demand for magnetos. Imports in this line are largely represented by the products of the German Bosch firm, but it has met with strong competition from the Marelli Co. of Milan, which equips the majority of Italian stock cars. This company also manufactures generators, motors and motor-pump sets, of which it exports enormous quantities. It is the exports of magnetos of this company which are responsible for the fact that exports exceed imports under the heading "Generators and motors with commutator type of collector."



Front and rear views of new Brewer air-cooled radial aircraft engine

Radial *Air-Cooled* Airplane Engine Designed by Capt. Brewer

New nine-cylinder powerplant has piston displacement of 630 cu. in. and develops 164 hp. at 1800 r.p.m. Weight with all accessories is 445 lb.

By P. M. Heldt

CAPT. R. W. A. BREWER of Philadelphia, with the financial backing of Harold F. Pitcairn, has developed a nine-cylinder radial air-cooled aircraft engine which is to be publicly exhibited for the first time at the Detroit Aircraft Show, April 14 to 21. Performance curves furnished the writer indicate that the engine will develop 164 hp. at 1800 r.p.m., its rated speed, and that the output continues to increase above this speed. Under full load at normal speed the fuel consumption was 0.47 lb. per hp.-hr., a very satisfactory performance.

The cast-iron cylinders have a bore of 4¼ and a stroke of 5 in., making the piston displacement 630 cu. in. Cylinders and head are integral, and the cooling fins are cast on. The cylinder heads are of hemispherical form and the valves are located in the head at an angle of 30 deg. with the cylinder axis.

A novel and ingenious method of securing the cylinders to the crankcase is employed. The lower end of the cylinder pilots in a bore in the crankcase. At the inner end of this piloting section there is a radial flange which rests against a gasket in a counterbore on the crankcase. A clamping ring of cast iron is cast at the same time as the cylinder, in between the bottom flange and the cooling fins. Four studs screwed into the crankcase pass through drill holes in the clamping ring, which latter is drawn down tight against the cylinder flange by means of nuts.

The valves have a clear diameter of 1⅝ in. and a lift of 7/16 in., and they are held to their seats directly in the cylinder castings by double springs, the inner spring being comparatively light. All 18 valves are actuated from a single cam having five cam lobes, the cam being concentric with the engine crankshaft and driven from the latter at one-tenth crankshaft speed by means of simple mechanism. Each lobe of the cam opens first the exhaust valve and immediately thereafter the intake valve. The conventional valve tappet with roller follower is used, together with a pushrod extending up to the cylinder head through a tube which makes an oil-tight joint with the pushrod guide and the valve rocker box.

This box is of original design. It consists of two aluminum castings, a base and a cover. The base is

bolted down to the cylinder head, being formed with a hole in it large enough to pass over the valve spring. The cover is bolted to the base by means of two screws at the ends, and also secured at the center. The base is formed with pedestals or lugs, which are slotted to receive the flattened ends of the rocker lever pivot pin, which latter is held in position by means of an adjusting stud that passes through the aluminum valve cover. Thus adjustment of the tappet levers can be made without removing the cover, by merely loosening a butterfly nut on the outside of the cover, turning the stud with a screw driver and tightening the butterfly nut again. The valve cover is oil-tight and the tappet mechanism is lubricated from the crankcase, as will be explained further on.

Crankshaft Made in Halves

The crankshaft is made in halves, with telescoping crankpin sections. Internal and external splines are formed on the crankpin portions of the two parts respectively. Both of the crankpin portions are hollow and the two parts are drawn together by means of a central bolt.

Aluminum alloy pistons are used, of a special design. The piston heads are dished and the bosses are supported directly by the head instead of by the skirt. There are three ⅛ in. piston rings at the upper end. Dishing of the piston heads and comparatively small overall length of the pistons tend to produce a very compact design of engine. The connecting rod assembly consists of a solid master rod with eight articulated rods. All of the connecting rods are made of duralumin forgings, with solid, rectangular section shanks, and all of the articulated rods are interchangeable. An unusual feature is that, although the crankcase is in a single casting, the connecting rods can be assembled separately and then introduced into the crankcase as a unit—a point of considerable importance in quantity production. A special procedure is necessary. With one half of the crankshaft in position the connecting rod assembly is introduced through the large opening in the rear of the case, two of the rods being passed through a single cylinder opening in the first place. As the connecting rod assembly is being introduced, the master rod is threaded over the crankpin, and the crankshaft is then slowly revolved to properly distribute the articulated rods, one through each cylinder opening. The crankpin has a diameter of 2½ in. and a length of 3 in.

By reference to the illustrations it will be seen that the crankcase has the desirable streamline form, decreasing in diameter as the propeller hub is approached.

The crankcase, after machining, weighs only 32 lb. while each of the cylinders weighs 18 lb. Two large roller bearings (Norma-Hoffmann) are used to support the crankshaft in the crankcase, while a larger ball bearing takes the propeller load. The crank arms are provided with suitable counterweights for balancing purposes.

A Zenith SV-8 1¾ in. carburetor is fitted, and is one of the items mounted on a so-called accessories carrier —an aluminum casting secured to the rear side of the crankcase. The carburetor is located below the crankshaft axis and bolts from underneath against a mounting flange formed on the carrier. The inlet passage formed in the carrier is surrounded by a jacket through which circulates the oil moved by the oil pumps, which results in imparting heat to the combustible charge and cooling the oil. From this passage the combustible charge flows into a rotary diffuser at the rear end of the crankcase. This diffuser comprises a rotor or runner with vanes on it which is keyed to the crankshaft and therefore rotates at crankshaft speed. The charge enters the diffuser chamber near the center and is moved by the vanes of the runner toward the circumference where there is an annular space from which connections are made to all of the inlet valves by means of tangential tubes with elbow-fittings of cast aluminum. The shape of the vanes, it is claimed, is such that turbulence and impact of the gaseous current are prevented and a very close approach to streamline flow is achieved. Cast aluminum exhaust diffusers are bolted to the exhaust outlets. These are L-shaped, the shorter arm of the L being bolted over the exhaust outlet, while the longer arm, which extends parallel with the crankshaft axis, decreases in diameter with increase in distance from the valve and in addition has a lengthwise slot in it which gives a slight muffling effect.

The lubricating system is of the dry sump type usual on aircraft engines. There are two Viking oil pumps which are mounted on the accessories carrier. The oil sump is a separate aluminum casting which is bolted to the bottom of the crankcase, and is shown in the front view of the engine. One of the pumps, referred to as the scavenging pump, draws oil from the sump and delivers it to the hot-oil jacket on the inlet passage in the accessories carrier. From this jacket the pressure pump draws its supply and forces it into the hollow crankshaft at a plain bearing on same where it passes through the accessories carrier. The revolving parts in the cam housing throw oil against its circumference where the pushrod guides enter. The pushrods act as pump plungers and force oil through the tubes surrounding the valve rods to the rocker lever covers, lubricating the working parts within these covers. Oil is fed under pressure to the crankpin bearing, the bearing surfaces of the articulated rods, and, through holes drilled in the shanks of the duralumin connecting rods, to the piston pin bearings.

A feature of interest in connection with the lubricating system is that only the relatively small amount of oil in the engine at any time is circulated, and not the entire supply carried on board. The result is that the oil becomes heated up quickly, even in cold weather, and attains its normal temperature in about two minutes from the time of starting. The supply of oil in the engine is constantly replenished as it is being used up, from a supply tank which feeds the system by gravity.

Timing Pinion

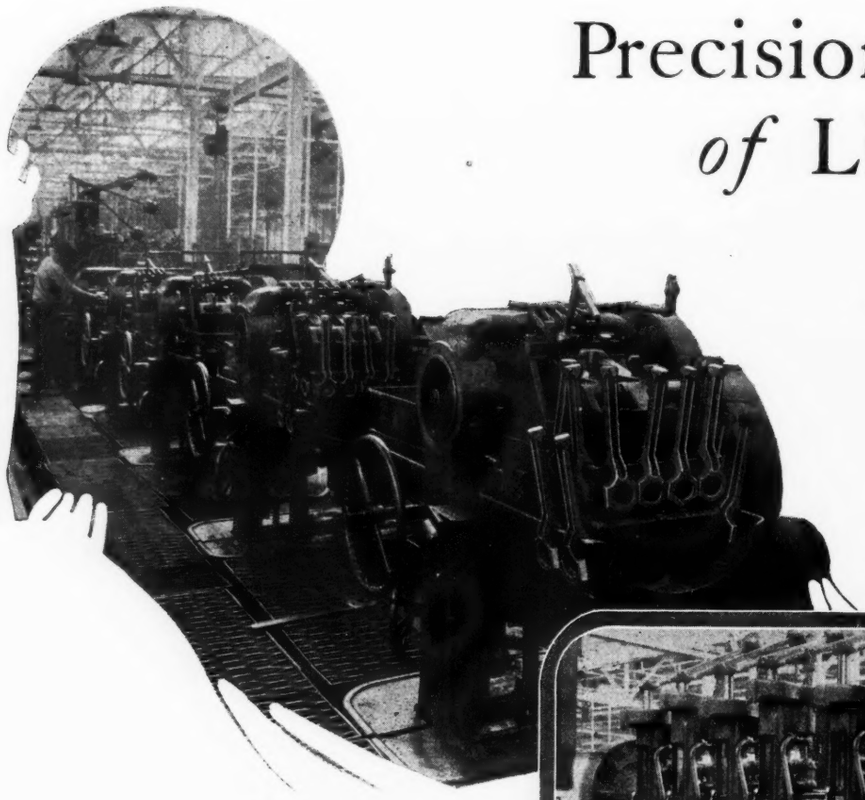
On the rear end of the crankshaft there is a timing pinion with which mesh three gears spaced around it at substantially equal angular distances. Two of these gears serve to drive the two oil pumps directly and the two Scintilla magnetos indirectly, while the third is the starter gear, being mounted concentrically with a seat or base for the Eclipse starter. The high tension cables from the magnetos are carried through a circular cable tube, with outlets at regular intervals, from each of which two cables extend to spark plugs mounted in the cylinder heads at opposite sides, midway between valves.

The engine complete with all accessories except starter weighs 445 lb. It has been subjected to a variety of tests to determine its characteristics. These tests have shown, among other things, that the engine is not affected to any great extent by changes in the fuel, spark timing and other operating factors which cannot always be kept constant in service. It has also shown a very satisfactory performance from the standpoint of output, as well as from that of consumption.

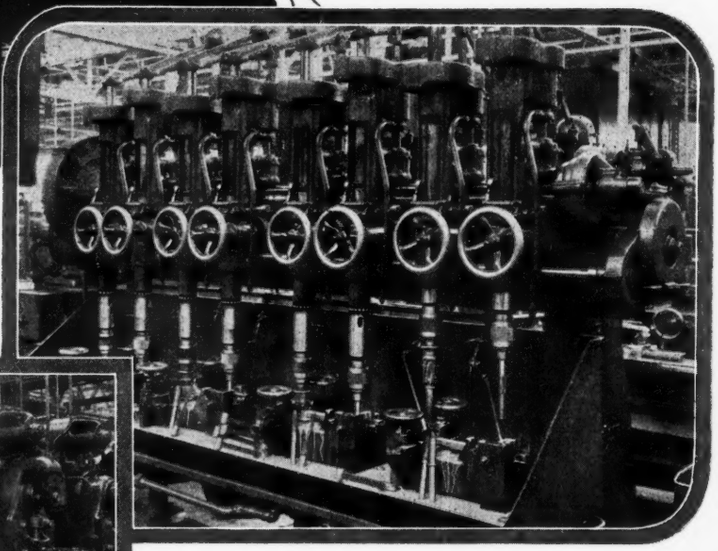
Precision Required *of* Lincoln Con

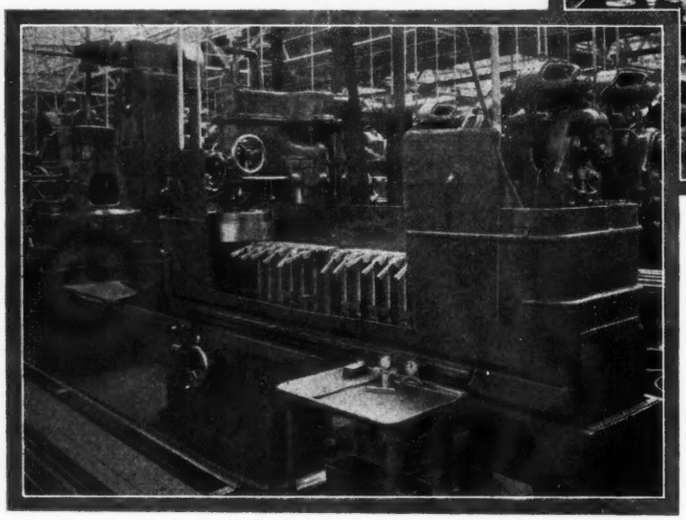
Very small tolerances per- on forked rods for V-

By K. W.



Above—Gang of millers employed to rough straddle mill the inside and outside of rod forks at Lincoln plant





Above—Gang drilling machine which rough drills and reams both ends of rods at once. Four rods can be operated on at once. Left —Grinding the joint face of rods. The indexing work fixture holds 24 rods

IN Lincoln eight-cylinder V-type engines there are of course, two types of connecting rods employed, plain rods like those used on most engines and split or forked rods. The machining operations performed on both rods are similar to a considerable extent but since those performed on the forked rod are a bit more complicated they will be described.

After the forgings are inspected they are heat-treated, which consists of heating them to 1470 deg. Fahr., quenching in water and drawing at 1200 deg. to produce a Brinell hardness from 196 to 241.

After hardening, drawing and pickling, a spot is ground for the Brinell test and the test made, after which the forgings are again inspected and straightened if necessary.

The first actual machine operation is to mill locating and clamping surfaces on the large boss which are used for locating the piece in a milling machine where the small boss is straddle milled.

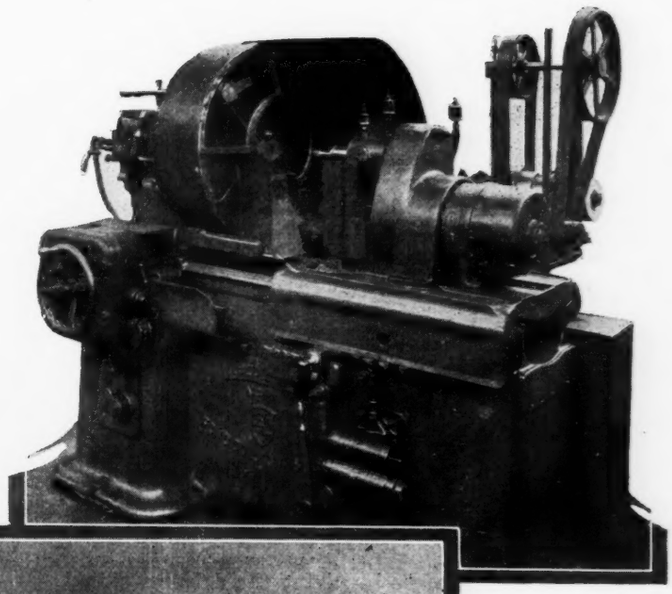
Another locating surface is milled on the end of the small boss in an end mill and the inside and outside of the fork are rough straddle milled. Finish milling the fork, both inside and outside, follows, and the ends of the boss are then straddle milled.

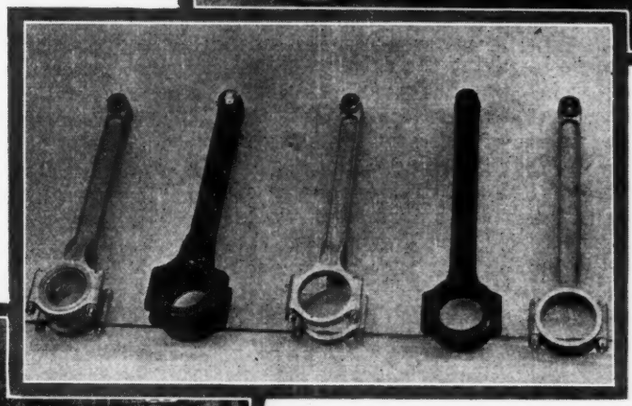
The holes in both ends of the rods are drilled and reamed, the latter operation being held to tolerances of .003 in. The sides and the edges of the channel are milled in the next two operations and a ¼-in. radius is milled in the channel slope. The bolt bosses

in Machining necting Rods

mitted. Operations carried out type engine described.

Stillman





Above — Internal grinding wrist pin hole, an operation performed just before assembly with pistons.

Left—Views of rods, both forked and solid, as they appear in the rough and when finished all over

Below—General view of connecting rod line showing two final inspection operations in the foreground

they may pass inspection. For example, the axes of the piston pin and big holes must be maintained parallel within 0.0004 in. within a distance of 8-in. tolerances for the diameter of the wrist pin hole is 0.001 in. and for the big hole the same. The thickness of the big end of the forked rod must be maintained within 0.002 in. and the space between the two forks within 0.002.

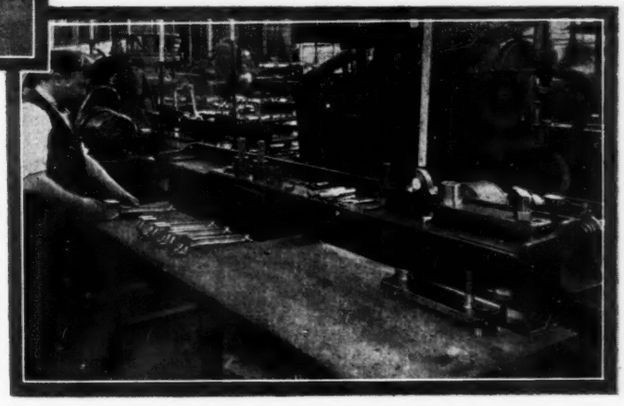
are finish form milled and the top of the cap circle milled.

The small end of the rod is then hollow milled and circle milled and the inside of the channel is finish milled. A sand blasting operation follows and then the caps are sawed off and the ends of the bolt bosses milled and burred.

Joint Face Ground

After spacing the forks and straightening them the joint face is ground and the bolt holes drilled and reamed, spot-faced and countersunk. Inspection follows and the rods are placed in stock. Final reaming and grinding operations are performed just before the rods are assembled with pistons in order to avoid damage to them in handling.

Tolerances permitted on these rods are so small that very careful machining is essential in order that



Another view of final inspection bench with a number of gages and instruments employed in checking rods

A RECENT publication of The Society for Electrical Development, Inc., is called "Profitable Application of Electrical Trucks and Tractors in Industry."

Solid-Tired Buses *Easier* to Brake, According *to* French Tests

Able to stop in shorter distance than when equipped with pneumatic tires. Brakes also prove to be more effective on sandstone pavement than on asphalt or on wood-block.

TESTS tending to show that solid-tired buses could be stopped more quickly than those equipped with pneumatics and that brakes are more effective on sandstone pavements than other types have been made for the Public Transport Co. of the Paris district by M. Abadie.

As the tests were made by giving the driver a signal to put on his brakes as he passed a given point, the results are probably none too accurate; however, the tests were more in the nature of a comparison between different road pavements, different conditions of road surface, different types of tire and different states of wear of the tires, and as any sources of error would affect all tests alike, the conclusions drawn from the results are undoubtedly sound. The following account of the tests is based on a report published in *"Le Poids Lourd"*:

The tests were made with the conventional type of four-wheel, 28-passenger bus which is in common use in the congested districts of Paris; it weighs 11,440 lb. empty and 17,160 lb. when loaded. The immediate object was to determine the distances in which the bus could be stopped on a level road when the brakes were applied suddenly from a speed of 12½ m.p.h., on different types of pavement.

The pavements chosen for the tests were in good condition. They were of three kinds, viz., sandstone, asphalt and wood-block. The tests were made while the pavements were in three different conditions: (1) dry, (2) wet after watering, and (3) in a wet, greasy condition. The wet, washed condition was obtained by first sprinkling the pavement abundantly, then sweeping it, in order to remove oils and other foreign materials that might have vitiated the results. Then the pavement was again sprinkled and it was also sprinkled several times during the tests. The pavement therefore was in the same condition as during and after a heavy fall of rain. The wet, greasy condition was obtained by spreading moistened clay.

Four Buses Used

Four motor buses were used in the tests, two of them being equipped with 41 x 7.4 in. pneumatic tires, single in front and dual at the rear. The tires of one of these were new, while those on the other had seen a great deal of service and the anti-skid treads had entirely worn off. The other two buses were equipped with solid rubber tires of 38 x 6.4 in. size, with unsymmetrical section, also single in front and dual at the rear. As in the previous case, the tires on one bus were new while those on the other had worn down practically to the limit permitted by the Transport Company.

The vehicles were brought to a stop by applying the hand brake, which acts on the rear wheels only. The brakes consist essentially of two bands formed of steel cable, to which are secured the wooden brake shoes. The ratio of multiplication of the brake linkage is such that the effort exerted by the operator on the lever is multiplied 63 times at the brake drum.

The distances required to bring the test vehicles to a stop were measured from a base line which the vehicles were required to cross at approximately 12½ m.p.h. The signal to apply the brakes was given to the operator by an official standing on the base line. An assistant on the vehicle read off the momentary speed from a speedometer. In addition, the mean speed of the vehicle over a distance of 100 ft. immediately ahead of the base line was independently determined by means of a chronometer.

Eight Trials Made

Eight trials were made in each case with each vehicle, four in one direction and four in the other, in order to eliminate the effect of grade. Finally, in order to eliminate all causes of error due to differences in the reflex actions of the operators, the latter were moved from one vehicle to another after each series of tests, so that at the end each of the operators had driven every one of the vehicles.

A total of 576 trials were run, and great efforts were evidently made to obtain trustworthy information. Naturally, the initial speeds fluctuated somewhat around the desired figure of 12.5 m.p.h. During the course of the trials M. Abadie found that the stopping distance is substantially proportional to the kinetic energy of the vehicle; that is to say, to the square of the speed at the time the brakes are applied. This made it an easy matter to reduce all results to the basis of an initial speed of 12½ m.p.h., from the chronometered speed for the last 100 ft. ahead of the base line.

From the results of the trials and a comparison of the figures obtained, M. Abadie drew a certain number of interesting conclusions regarding the effects of different pavements and different tires.

With the different pavements in the dry condition the stopping distances did not vary materially, being 17 ft. for sandstone, 18.3 ft. for wood, and 17.2 ft. for asphalt. The results were entirely different, however, when the pavements were copiously watered or when they were in a greasy condition. With the sandstone pavement under the most unfavorable conditions the stopping distance was only 1.5 times as great when wet as when dry, while for the wood-block pavement it was 2.7 times as great and for the asphalt pavement, 3.88 times.

If a coefficient of one is given to the average of all stopping distances on sandstone pavement, the co-effi-

cient becomes 1.72 for wood-block pavement and 2.06 for asphalt.

These various observations confirm the general opinion of engineers and drivers that wood-block and asphalt pavements present serious disadvantages from the safety standpoint when they are in a wet or greasy condition, not ony because they greatly increase the distances in which vehicles can be stopped by means of their brakes, but also because they promote side skidding.

Now as regards the effects of the tires on the stopping distance, it was found that a motor bus fitted with solid rubber tires could be stopped from 12.5 m.p.h. in 16.6 ft. on sandstone payment, in 17.2 ft. on wood-block pavement, and in 16.6 ft. on asphalt pavement. A motor bus fitted with pneumatic tires required 17.5 ft., 20.3 ft. and 17.7 ft. on the three kinds of pavement respectively, which is an average increase of 10 per cent.

Quick Stop on Sandstone

On a watered and swept pavement the solid-tired vehicle was stopped in 19.9 ft. on the sandstone, 44 ft. on the wood-block pavement, and 38.9 ft. on the asphalt, while the pneumatic-tired vehicle on the same pavements was stopped in 22½ ft., 46 ft., and 57 ft. The increases in the stopping distance were 11 per cent for the sandstone pavement, 4 per cent for the wood-block pavement and 48 per cent for the asphalt. For the same pavements but in a wet, greasy condition the percentages of increase were 18, 16 and 19, respectively.

For the three types of pavement in their three different conditions the average increase in the stopping distance with pneumatic over solid rubber tires was 16 per cent.

As regards the effect of the state of wear on the braking efficiency, the test results showed that the stopping distances are substantially the same for new and worn-out solid rubber tires, the mean of all results of tests made with new tires being 31.1 ft. and the mean of all tests of worn-out tires, 30.8 ft. It is far from being the same with pneumatic tires, for which the mean stopping distance increased from 36 ft. to 48.8 ft. The increases occurred chiefly on wet, washed pavements and they were particularly great on wet, greasy pavements. On dry pavements the stopping distances were substantially the same or even smaller when the pneumatic tire was well worn. On the average, the stopping distances for motor buses fitted with worn-out pneumatic tires were 30 per cent greater than those of the same vehicle with new pneumatic tires. This, of course, is due to the wearing away of the anti-skid treads.

Metropolitan S. A. E. Meets on Motor Liner

A DIESEL engine meeting was held by the Metropolitan Section of the S.A.E. on the evening of March 28 aboard the Cosulich motor liner Saturnia at her dock in New York. The meeting was a joint one with the National Association of Engine and Boat Builders, and the hope was expressed that hereafter there will be closer cooperation between the S.A.E. and the boat builders. Col. Wall, president of the S.A.E., and Henry R. Sutphen, president of the boat builders, both spoke briefly.

J. Arkebauer, port engineer of the Cosulich line, gave some data regarding the engines with which the Saturnia is equipped. These are two double-acting eight-cylinder Diesel engines built in Triest, Italy, under Burmeister & Wain license. They have a bore of 33 1/16 in. and a stroke of 59 in. and run at 120 r.p.m. Each engine develops 10,000 hp. when running as a direct Diesel engine, but 12,000 hp. when operating with a supercharger. Mr. Arkebauer said it had been found by investigation that by using a supercharger the horsepower of each engine could be increased by 2000 at one-half the additional investment which would be necessary if the engines were built large enough to develop 12,000 hp. each without supercharger. The cylinders are sea-water-cooled and the pistons are oil-cooled, and the oil used for cooling is the same as that used for lubrication. It is indicative of the large size of the engines that one piston and its piston rod together weigh 5 tons.

Fuel consumption is at the rate of 0.31 lb. of oil per horsepower-hour which is equivalent to a thermal efficiency of 39 per cent. In addition to the two main engines, six other Diesel engines are carried on board, three for driving air compressors and three for driving electric generators. Only two air compressors and two generators need be run at one time, the third unit of each kind being held in reserve. These auxiliary engines, which have a combined rated horsepower of 6000, are not quite as efficient as the main engines but consume about 0.352 lb. of fuel per horsepower per hour. The engines control very well and can be idled down to 18 r.p.m., at which speed the propeller thrust is almost nil.

Engines 25 Years Ago

O. D. Treiber of the Treiber Diesel Engine Co., Camden, N. J., who presided while the papers were being presented in abstract, gave an outline of the rise and decline of the American merchant marine. H. D. Hill of the Hill Diesel Engine Co. of Cleveland, Ohio, gave a talk called "Reminiscences of Twenty-Five Years in the Internal Combustion Engine Industry." He said the Diesel engine occupied about the same position in the eyes of the general public today that the gas engine did 25 years ago. He was very optimistic regarding the application of Diesel engines for automotive purposes.

C. L. Cummins of the Cummins Engine Co., Columbus, Ind., spoke of the development by his company of a small Diesel engine to meet modern fuel requirements. This engine has been described in Automotive Industries. Prof. Charles E. Lucke of Columbia University spoke on the thermodynamics of the Diesel engine. An inspection of the ship's engines concluded the meeting.

THE Bureau of Standards, Washington, D. C., has issued Circular No. 346 on Light Metals and Alloys, Aluminum and Magnesium, which takes the place of a circular issued in 1919. The physical and mechanical properties of aluminum and magnesium and of their light alloys, and the variation in properties caused by changes in the conditions of manufacturing operations, by changes in the composition of the alloys, by impurities, by mechanical working and by heat treatment are given. The selection of the data available has been made and the data have been checked by representatives of the light alloy industries in order to assure reliability. Equilibrium diagrams for the important alloy systems are given. The metallography, corrosion, resistance and methods of protection against corrosion, the theory of heat treatment, and the application of the alloys to industry are discussed.

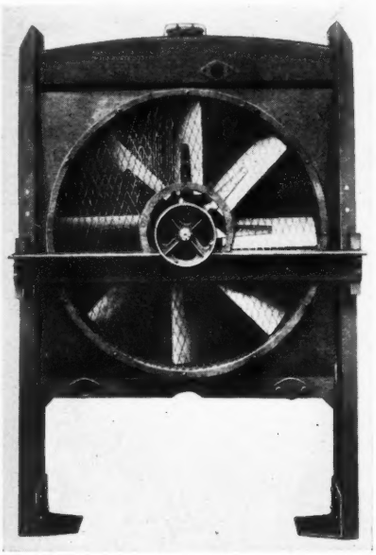
NEW DEVELOPMENTS—Automotive

Radiator for Diesel Engines

A NEW type of radiator for Diesel and heavy duty engines has been announced by the Perfex Corporation, Milwaukee, Wis. The new feature is the mounting of a large fan directly on the radiator frame. This is completely protected by a screen as shown, and shrouded to insure uniform air circulation over the entire radiator. The fan is carried on anti-friction bearings and provided with a large belt pulley.

These radiators also incorporate removable core sections. Each unit is securely held in place by four nuts. This permits removal and repair of any section without dismantling the radiator and also continued operation of the powerplant for reasonable periods while a section is out. An alternative is to carry a reserve section which can be put in the place of a damaged section in a few minutes.

The cores of these heavy duty radiators are made of copper. The tubes are oval in shape and have double lock seams. Copper fins, strengthened by hemmed front and rear edges, are baked onto the tubes. The radiators are made in sizes suitable for engines of from 50 to 350 hp.



Perfex radiator for Diesel engines

Jaeger Stop-Watch

AN eight-day chronograph stop-watch for use with airplanes, racing cars, speed boats and wherever accurate measurements of time are required, has been placed on the market by the Jaeger Watch Co., of New York, and Geneva, Switzerland.

The chronograph hand indicates fifths of a second on the outer scale of the dial. The window in the dial, which shows 0 in the illustration, registers minutes during which the stop-watch hand operates, going up to 30 and repeating.

Jaeger chronograph stop-watch with eight-day movement

The movement is 11 jewel, the case is aluminum and the dial is black with white figures. Silver dial with black figures and hands are available as is also radium-treated numerals and hands. The watch weighs 11 oz.

Drill for Hard Steel

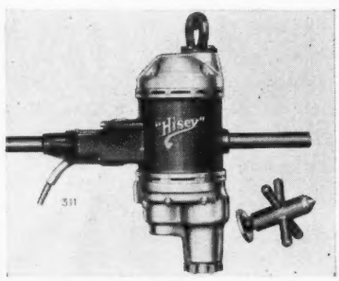
MORSE TWIST DRILL & MACHINE CO., New Bedford, Mass., by the use of a drill of special structure made of a new cobalt steel has been able to drill satisfactorily high manganese steel, something that hitherto has been practically impossible.

The special drill was designed to withstand extreme torque and point pressure and, with one grinding, was used to drill nine holes 1½ in. deep through a railroad frog made of steel with 1.08 per cent carbon, 10.04 per cent manganese and having a Brinell hardness of 207-217.

Drills similar to these test drills are available upon specification for use in such severe services.

1¼ In. Hisey-Wolf Drill

THE Hisey-Wolf Machine Co., Cincinnati, has announced a new 1¼ in. capacity universal drill. The standard Hisey motor with which it is powered is mounted in ball bearings. The gear on the armature shaft is removable and the compound gear shaft is supported with a bearing at each end. The drill spindle is fitted with a No. 3 Morse taper socket and is



Hisey 1¼-in. Universal drill

Parts, Accessories and Production Tools

hardened and ground and automatically lubricated.

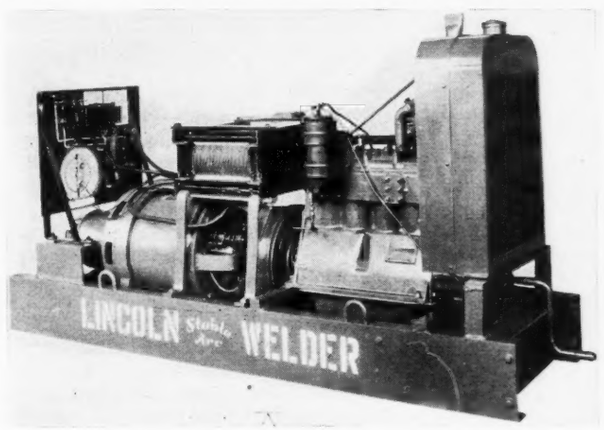
Brush holders with adjustable spring tension are mounted as a separate unit on a Bakelite yoke. A Hisey automatic self-release switch is standard equipment.

Portable Arc Welder

A NEW Stable-Arc welder known as Model S-1960, a gas-engine driven, portable, self-contained equipment, is the latest development of the Lincoln Electric Co., Cleveland.

The unit has a rating of 200 amp. with a current range for welding duty from 50 to 300 amp. It operates at a speed of 1500 r.p.m. Motive power is furnished by a four-cylinder Continental Type H-9 engine.

The generator and engine are mounted on a welded structural steel base. The generator is made of welded steel also instead of cast iron. The magnetic circuit



Lincoln Electric Model S-1960 gas-engine driven, portable Stable-Arc welder

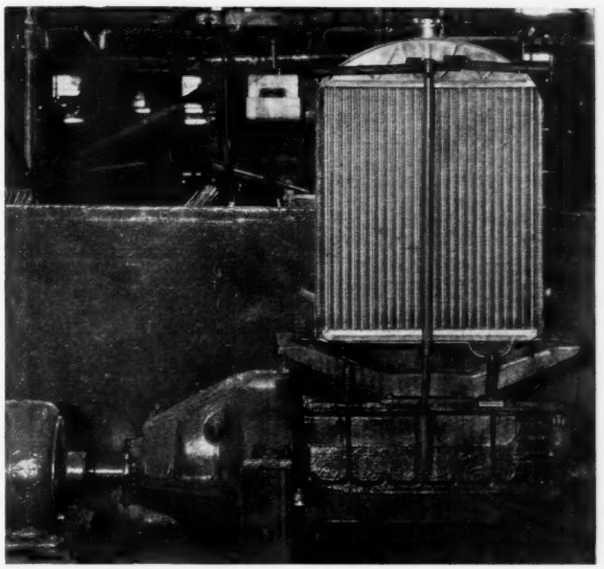
of the generator is of laminated steel construction to increase the stability of the arc. A steel switchboard is provided in place of the usual slate panel. The whole unit weighs 1580 lb. and is 76 in. long by 25 in. wide.

Transmissions Improved

RECENT improvements have been made to the variable speed transmissions made by Reeves Pulley Co., Columbus, Ohio, in order to make them still more efficient. These changes include the use of a double-block, center pull, V-belt; a metal splice block; more compact frame; disk lubrication; more positive screw locks and a standard speed indicator.

Ford Radiator Test

AT the Highland Park plant of the Ford Motor Co. radiators for the Model A are given a very severe test for strength and rigidity. The machine shown in the accompanying illustration has been designed to shake and jolt a water-filled radiator to an extent which would be almost impossible to obtain in a long period



Radiator jolting equipment used to test Ford Model A radiators

of service over the roughest roads at high speeds.

Ten hours is given to the test of a radiator and during this time it is estimated that the radiator gets more severe jolts and jars than the average Ford car will get during its whole lifetime of service.

In addition to this jolting test, all radiators are given a compressed air test under water to detect any leaks.

Warner Electric Brake

THE Warner electric brake, developed by the Warner Electric Brake Corp., Beloit, Wis., and described in *Automotive Industries*, Jan. 22, 1927, is now being placed in regular production after extensive tests to prove its value. It is particularly designed to control trailers so that one, two or more loaded trailers can be made up into a train which can be moved in safety.

REGISTRATION statistics covering the second and third quarter of 1927 in the Union of South Africa, which have just been released by the Office of Census and Statistics of the Union, demonstrates once more that in spite of the increasing activity of European manufacturers, particularly of Great Britain, to get a greater share of this market, American motor vehicle makers are still dominant in this important foreign outlet.

There were 32,765 motor vehicles registered during the second and third quarters of 1927 and 25,203 of them, or 76.9 per cent, were of American origin.

Total passenger car registrations were 23,108, of which 21,281 have been divided into makes of cars. Of this later number 20,292 or over 95 per cent are cars originating from the United States or Canada.

Only three foreign built cars are represented in the Union by over 100 vehicles and the total registrations of these three makes—Austin, Fiat and Morris—is less than 1000 cars.

AUTOMOTIVE NEWS SECTION INDUSTRIES
Philadelphia, Pennsylvania April 7, 1928

Second Quarter Shipments Seen Exceeding 1927 by 35%

NEW YORK, April 5—Probably the best indication that the present trend toward increased production schedules will be maintained throughout the second quarter is the estimates on freight car requirements as compiled by a majority of automobile manufacturers. Figures reveal that estimated requirements for the second quarter will run nearly 35 per cent over the actual number of freight cars used during the second quarter of 1927. The estimates do not include fractions of carloads but merely represent a projection of the number of full cars which the companies believe will be required to fill their needs during the period.

Stocks of new automobiles in dealers' hands are showing increases under the influence of heavy manufacturing schedules now in effect in practically all leading car factories. Production totals for March will run considerably ahead of the February figures and will compare favorably with the March, 1927, total, which was one of the three high production months that year.

Retail movement of cars showed consistent improvement in March as the season advanced, the later weeks' sales carrying the month to new high delivery totals in many cities. Increasing employment in practically all industrial districts and better road conditions in the rural sections have had material effect in promoting early deliveries. Business in the Northwest farming districts is distinctly better than in the early part of 1927.

The generally improved sales conditions in March are seen by dealers as indicating a buying movement in the quarter now opening which will be fully as large as in previous spring

(Continued on page 570)

N.A.C.C. Production 396,878 in March

NEW YORK, April 4—Automobile production by members of the National Automobile Chamber of Commerce for the month of March reached a new record of 396,878, which is 15 per cent above the previous record of 342,820 established in April, 1927. This figure also compares with 320,822 for February of this year and 327,489 for March a year ago.

Output for the industry as a whole in March a year ago was 417,686, being only 10,808 above the N.A.C.C. figures for March of this year. As Ford production for the month was 25,720, this added to the N.A.C.C. total will bring the March output to 422,598, an increase over the 1927 figure. This total also will be increased by the output of the number of smaller truck companies who are not N.A.C.C. members.

Rubber Restrictions Removed by Baldwin

NEW YORK, April 4—All restrictions on export of rubber from British Malaya and Ceylon imposed by the Stevenson Act will be removed Nov. 1, it was announced today by Premier Baldwin in the British House of Commons. In view of the failure of the restrictions to maintain prices at about the 40 cent level, the removal has been expected, particularly since the appointment by the Premier of a committee to investigate the rubber situation.

Though removal of the restrictions had been discounted, the announcement caused a selling wave on the Rubber Exchange which broke all trading records and resulted in a maximum decline of nearly 6½ cents a pound. As a result of the liquidations here and in London, holders of rubber stocks, estimated at 250,000 to 275,000 tons, have lost heavily.

The American Rubber Pool, which is understood to hold between 35,000 and 40,000 tons purchased at 41 cents, plus warehouse, interest and other charges. is said to face a paper loss of about 50 per cent on its holdings or approximately $19,000,000.

Wire Wheel Not Seeking Monopoly, Says Jackson

BUFFALO, April 4—Legal action against manufacturers of motor wheels who infringe upon his company's patents will be undertaken by the Wire Wheel Corp. of America, H. Gardner Jackson said. No suits are planned against car manufacturers.

Mr. Jackson said:

"The policy of the Wire Wheel Corporation is to license other wheel manufacturers to operate under our patents, as an assurance to the automotive industry that it will be able to purchase wire wheels on a competitive basis and not a monopolistic one.

Hoover Says Business "Distinctly Better"

WASHINGTON, April 4—Indications that business conditions generally throughout the United States are getting "distinctly better" were expressed by Secretary of Commerce Hoover, this week. As illustrating the improved business conditions, the secretary points out that building construction, on the basis of awards of contracts, is running 13 per cent above that for 1927. Building construction, he said, is the best indicator of business conditions.

Dana Factory at Toledo Now Nearing Completion

TOLEDO, April 2—A new and powerful factor in Toledo's automotive industry will be the new Dana Mfg. Co., headed by Charles A. Dana, president and general manager of the Spicer Mfg. Corp., which is now completing a new plant 300 by 500 ft. on a 30-acre site served by the Michigan Central and New York Central railroads. The plant represents an investment of about $500,000 in land, buildings and machinery.

It has been under construction for five months. Plans call for employment of 1200 men here by the company when it gets into full production. It is understood the company will make universal joints and probably some of allied products such as clutches, shafts, axles and steel frames for the automotive industry.

Star Now Durant Four

ELIZABETH, N. J., April 2—Effective immediately, the name of the Star car has been changed to the Durant Four (Star Series), by Durant Motors, Inc.

All production records in the plant of Durant Motors, Inc., were smashed in March with an increase of 1661 cars over previous record month, the March total being 9661 cars. These figures do not include cars manufactured at other Durant plants located at Lansing, Oakland, Cal., or Leaside, Ont.

Bosch Sees Peak Business

NEW YORK, April 4—American Bosch Magneto Corp. has reelected all retiring directors and officers. Business outlook for the corporation is said to be the best it has been in five years with certain departments working three eight-hour shifts daily.

Mellon Opposition Reopens Tax Conflict

Senate Committee Restores Item Following Treasury Statement

WASHINGTON, April 4—A tax reduction of $201,000,000 is all that the Treasury Department's finances will warrant, Secretary of the Treasury Mellon this week told the Senate finance committee when he presented data showing that the surplus at the present time is approximately $400,000,000. He told the committee that the present automobile tax of 3 per cent, which was repealed by the House, should be restored and thus save $66,000,000 for the Treasury. By a party vote of 11 to 9 the committee later restored the tax. The fight will be carried to the floor of the Senate by the Democratic minority.

In urging restoration of the present automobile tax of 3 per cent, the Secretary declared that "the insistent demand for repeal of this tax does not come from automobile purchasers but from manufacturers and dealers who have organized an intensive propaganda and of necessity do not look at our tax problem as a whole, but concentrate their attention on the one tax which they believe affects their own interest.

"Tax revision on the basis of meeting the demands of special interests such as the automobile industry," he said, "inevitably leads to serious maladjustments of tax problems. As a principle, it is difficult to justify the repeal of this tax. Levied at a low rate, it imposes no bitter hardships, yet by reason of the broad base upon which it rests, it produces substantial income."

The secretary's assertion that the repeal of the excise tax was not sought by the users was emphatically denied in a statement issued by J. Borton Weeks, of the American Motorists' Association, expressing the views of 250,000 motorists.

Motorists Want Tax Removed

"That part of the Secretary's statement before the committee denying that the automobile purchasers themselves have no special interest in the repeal of the tax is not based on fact," President Weeks declared. "Since its inception two years ago, our association has repeatedly gone on record with the Treasury Department and Congress insisting that it, as a war-time measure, should have been repealed when the emergency was past. The American Motorists' Association, which is in no way subsidized by the automobile manufacturer, is unequivocally opposed to a continuation of the tax."

That the manufacturer was carrying on any unethical propaganda or campaign for repeal of the tax was equally emphatically denied by Congressman Robert H. Clancy of Michigan. Mr. Clancy also declared that the surplus would be nearer $600,000,000 than the $400,000,000 as represented by the Secretary. He declared that the Senate should repeal the automobile tax in toto and expressed a belief that the Senate, despite the administration program, would follow the House.

"This is the administration's last ditch fight to save the sales tax principle," Mr. Clancy declared, expressing the view that the farm-bloc in the Senate in, and of, itself would control enough votes to eliminate the tax, should it be included in the Senate Finance bill. "Added to the farm-bloc and Democratic votes," he declared, "the Republicans and a large number of the 'regular' Republicans would vote for the elimination."

President Backs Mellon

Following the testimony of Secretary Mellon, a spokesman for President Coolidge declared that the President felt that the tax reduction should not exceed $190,000,000. The President's views were expressed as follows:

"The Secretary of the Treasury, Andrew W. Mellon, in submitting before the Senate Committee on Finance his recommendations that tax reductions should not exceed $190,000,000 did so with the President's approval. After going over with Secretary Mellon the figures as to income tax returns and considering all the conditions as they exist at the present time, the President approves the recommendations should not exceed $190,000,000, so the President feels that the figure of $190,000,000 set by the Secretary was as far as the Government should go in tax reduction at this time."

Webster Resignation Accepted by A.E.A.

CHICAGO, April 3—The resignation of William M. Webster as commissioner of the Automotive Equipment Association was announced last night at the close of the two days' special meeting of the association's board of directors. Acceptance of the resignation, which is effective immediately upon orders transferring the accounts of the association to a successor, was announced by President A. C. Storz of the A.E.A.

The directors have placed B. W. Ruark, assistant commissioner, in charge of the association's affairs until the June convention.

"The Association has rededicated itself to making merchandising the major activity," said Mr. Storz. "There is no doubt in our minds that merchandising and marketing activities will be the outstanding accomplishment to which we shall point at the June convention." It was also learned that the directors returned unqualified control of the affairs of Greater Market Development to the hands of Harry G. Moock, managing director."

Business in Brief

Written exclusively for* AUTOMOTIVE INDUSTRIES *by the Guaranty Trust Co.

NEW YORK, April 5—Activity in the speculative markets continued at a furious pace last week. The price trend was still toward higher levels, though the advance was less marked than a week earlier. The huge volume of transactions was reflected in a further increase of $46,000,000 in brokers' borrowings during the week ended March 28, bringing the outstanding total to within $10,000,000 of the peak figure recorded on Feb. 8. Increasing demands for funds, due in part to the month-end settlements, have resulted in an advance in money rates, call money at New York having reached 5½ per cent on Monday of this week, the highest level reported since the first week of January.

FEDERAL RESERVE REPORT

A larger demand for credit is also indicated by the report of member banks of the Federal Reserve system in leading cities for the week ended March 28. Loans secured by stocks and bonds have advanced to the highest point reached since January, while "all other" (mainly commercial) loans are at a new peak. The use of Federal Reserve credit also increased during the final week of March, an advance of $47,000,000 in discounts of the Federal Reserve banks having been accompanied by small gains in open market purchases and holdings of Government securities. Reserves, in the meantime, have declined, and now stand at the lowest figure since January.

GENERAL TRADE

Trade in general is in fairly large volume, though still restricted by unfavorable weather in many parts of the country. Sales of two leading mail-order houses last month were 1.6 per cent larger than in March, 1927, while the total for the first quarter of the year is 5.5 per cent above that of a year ago.

BANK DEBITS

Commercial check payments, as measured by bank debits to individual accounts in 140 cities, not including New York, in the week ended March 28 were 9 per cent larger than in the corresponding period last year.

FREIGHT CAR LOADINGS

Railway freight car loadings continue to run below last year's figures, the total for the week ended March 17 being 942,086 cars, which compares with 1,001,932 cars a year ago and 977,018 cars two years ago.

PETROLEUM OUTPUT

A slight decline in crude petroleum production occurred during the week ended March 24, average daily output during this period amounting to 2,387,000 bbl., which compares with 2,388,600 bbl. in the preceding week and 2,461,950 bbl. last year.

Many Companies Set High March Records

Chevrolet Ships 103,657, and New Totals Scored by Hupp and Graham-Paige

DETROIT, April 2—Chevrolet Motor Co. production continues to set new marks. Output for March was 103,657 units and it is expected that practically the same rate will be maintained during April.

Chevrolet production for the first quarter totals 342,189, compared with 267,393 in the first quarter last year.

Packard set a new record in March, shipping 4428 units, compared with 4404 in February, the best previous month.

Hupp Motor Car Corp. set a new all time record in March, shipping 8034 units, a gain of nearly 3000 over February, the best previous month, when shipments totaled 5218. The figure brings shipments to 16,870 for the first quarter, a gain of 43 per cent.

A new all-time record was set by the Graham-Paige Motors Corp. in March when 7616 units were shipped. The mark exceeds any month in the history of the former Paige-Detroit company.

Dodge Brothers, Inc., produced 26,895 units in March, a gain of 29.8 per cent over February, bringing production for the first quarter to 60,387, compared with 46,566 in the first quarter of last year.

Buick output was between 18,000 and 19,000 in March, compared with 18,600 in February.

Output of Cadillac-La Salle was 4500 in March, compared with 3750 in February.

Studebaker built 16,500 units in March, compared with 15,132 in March, last year. Studebaker production for the first quarter totals 36,000, compared with 30,500 in the first quarter of last year.

Marmon built 2581 cars in March, setting a new all-time record for the company. Output for the first quarter totals 6722, a gain of 81 per cent over the corresponding period of last year.

Ford Production 25,720

Ford Motor Co. made 25,720 cars in March, bringing output of the Model A up to 50,000 since the car was announced last December. The company goes on a 2000 a day schedule this week. Some dealers in the Detroit area report that the company has promised to double the number of deliveries in April as compared to March.

With an April schedule calling for 7500 more Oakland and Pontiac Sixes than during April of 1927, the Oakland Motor Car Co. is establishing a production record of nearly 100,000 cars for the first four months of the year. This Oakland-Pontiac production represents an increase of 85 per cent over the 1927 period.

St. Louis Bank Finds Car Sales Improved

ST. LOUIS, March 31—Distribution of automobiles made a remarkable gain during March as contrasted with recent months, the monthly business report issued by the Federal Reserve Bank of St. Louis for the Eighth Federal Reserve District states. The month's total was also 1.7 per cent greater than in March last year, according to the report, in which steady expansion in the iron and steel industry is also cited. The Eighth Federal Reserve District comprises Arkansas and parts of Missouri, Illinois, Indiana and Kentucky.

Willys to Announce Lowest Priced Six

TOLEDO, April 3—A new Whippet Six, the lowest priced six-cylinder car in the world, will soon be announced by the Willys-Overland Co., according to a statement by John N. Willys, president. While actual prices of mechanical details are not available as yet, it is stated the car will have such features as a seven-bearing crankshaft, full force feed lubrication, silent timing chain, unusual long connecting rods, Nelson type invar strut pistons and four-wheel brakes.

According to Mr. Willys, 100 of these cars have been in the field and have been tested for 300,000 miles. It was also stated that one of these cars recently broke the 24-hour speed record for cars under $1,000 by establishing an average of 56.52 m.p.h. for the distance. On a 50-mile test on the Indianapolis track the car averaged 63 miles.

Defend Railroad Practice

NEW YORK, April 2—The practice of Western railroads in assembling wide door box cars at Chicago as a means of promptly filling automobile factory shipping requirements was defended at a hearing before the Interstate Commerce Commission in Washington last week by a special committee representing the members of the National Automobile Chamber of Commerce, consisting of P. G. Findlay, George A. Main, K. A. Moore and J. S. Marvin, chairman, N.A.C.C. traffic managers' conference.

Peerless Brougham $1,195

CLEVELAND, April 2—Peerless Motor Car Corp. has added a brougham model to its Six-60 line, priced at $1,195. The Six-80 sedan is now being equipped with saddle lamps instead of the former cowl lamps and a cadet visor is now used.

Hudson to Continue 1550 Daily Schedule

Sets Quarter Record of 91,500 Cars—Five-Day Week Shows Economy

DETROIT, March 31—The Hudson Motor Car Co. will continue its record-breaking schedule of 1550 cars daily into April. The company reports that the five-day rather than the five and one-half day week has developed so promisingly as to economies of production that it will be continued for further trial. Machine departments are busy on two and three-shift basis five days a week.

March shipments were in excess of 35,000 units. This combined with 30,000 in February and 25,000 in January makes a total for the quarter of 91,500 automobiles compared with 74,000 during the first quarter of 1927. The company reports that export shipments as well as domestic and Canadian demands were at the highest point in the first quarter of this year. Extra shipments were necessary to many export markets.

The moderate winter is believed largely responsible for the heaviest Hudson-Essex retail sales ever known for this season of the year. Distributors and dealers are said generally to have moderate stocks of cars to meet the spring demand, despite the high level of production.

Velie Aircraft Engine to be Used in Monocoupe

MOLINE, ILL., April 5—Velie Motors Corp. announces that it has gone into production on a five-cylinder air-cooled radial aircraft engine which will be used in the "Monocoupe" sport-type airplane built by Mono-Aircraft, Inc.

Recently a Moline syndicate, in which the younger Velies are leaders, acquired the Monocoupe company of Davenport, Iowa, a plane-building concern, and moved its plant and equipment to the vacant Velie Carriage Works in this city, where manufacture of the Monocoupe was continued.

The Velie aircraft engine has a bore and stroke of 4⅛ by 3¾ in. and develops 70 hp. at 1800 r.p.m. and 80 hp. at the maximum of 2000 r.p.m. The compression ratio is 5.2 to 1. Weight, dry and without hub or starter, is 210 lb., giving a weight of 2.63 lb. per rated horsepower.

Farmer Mortality Lower

WASHINGTON, April 4—Bankruptcy of the American farmers during 1927 showed a slight decrease, compared with the three previous years, according to a survey just completed by the Department of Agriculture. Bankruptcies last year averaged .99 per 1000 farmers, compared with 1.2 in 1926, 1.23 in 1925, and 1.22 in 1924.

Willys Lowers Prices on Standard 6 Line

Models Are Now Priced $995 to $1,045—Company Effects Economies

DETROIT, March 31—Price reductions in the Willys-Knight standard six models were announced today by John N. Willys, president of the Willys-Overland Co. The new low prices are, five-passenger coach $995, a reduction of $150; five-passenger sedan reduced $150 to $1,095; coupe formerly selling at $1,195, now listed at $1,045; the Victoria and roadster models reduced to $995.

Mr. Willys said that the new low prices are made possible through various manufacturing economies that have been effected and through record-breaking business done by the company on all their models during the first three months of 1928. Business of the company for the first quarter shows an increase of 42 per cent over the corresponding period of last year. March was the largest month in the company's history.

Falcon Lowers Prices $100

DETROIT, March 31—Falcon Motors Corp. announced today a price reduction of $100 on all its models. The new prices are two-door sedan, $995; coupe $1,045 and four-door sedan $1,095. It was stated that production of a new Gray Ghost Roadster will be under way in about two weeks. Details of this new car will be announced at that time.

1000 Seek Appointments as Army Flying Cadets

WASHINGTON, April 4—An indication of the interest that is being taken in aviation may be gleaned from the number of applicants who have applied to the War Department for permission to take an examination for appointment as flying cadets in the Army Air Corps on April 10. The department announces that more than 1000 have already applied, and it expects that this number will reach 1500 before the examination date. Of this total, only 220 will be accepted. Candidates must be unmarried, male, citizens, over 20 and under 27 years of age. In addition to these requirements, they must possess two years' college work and be physically fit.

Loening Builds Amphibian

NEW YORK, April 2—The Loening Aeronautical Engineering Co.'s first commercial amphibian plane was exhibited and tried out yesterday by about 50 persons. This plane, which is powered by a Pratt & Whitney Wasp air-cooled engine and has a capacity for six persons, is similar to the Loening amphibians made for army and navy use. This plane will sell for about $25,000.

Ford School Adds Course in Textiles

DETROIT, April 2—Ford Motor Company has added a course in textiles to the curriculum of the Highland Park unit of the Henry Ford Trade School. The different kinds of textile fibers that are used in the industry, their source and purpose, and how they are made into cloth, will be covered in detail. Following the usual methods of academic training in the school, this department will use the Ford textile industry as a laboratory for the course. Shop trips will be taken by the classes to the textile departments of the company, where modern production methods of cloth manufacture are in operation.

Kansas City Sales Off 256 in February

KANSAS CITY, March 31—Motor car registration for Jackson County, which includes Kansas City, in February showed a falling off of 256 cars, but this was all in the light car field. In the higher price and medium price classes substantial gains were made, the registration figures just made public reveal. The total this year was 2180 to 2436 a year ago.

The biggest losses were made by Ford and Chevrolet. The Ford registration was 656 a year ago while this year only a few of the Model A cars were being delivered and the registration dropped to 108. Chevrolet had a loss of 116, the figure being 725 last year and 609 this year. The Ford assembly plant here is now building 150 cars daily.

Hudson-Essex was one of the lines to make big gains, the registration showing 242 this year compared with 146 a year ago. Pontiac had 103 this year to 41 last and Whippet 115 to 41. Chrysler sales jumped from 62 last year to 108 this, and Pierce-Arrow from 4 to 17. Lincoln sales were 10 this year compared to 6 last.

James B. Ford

NEW YORK, March 31—James B. Ford, vice-president of the United States Rubber Co. and director in a number of other industrial concerns, prominent sportsman and philanthropist, died at his home here this week of pneumonia. Among Mr. Ford's other business affiliations he was vice-president of the Atlantic Coast Lumber Corp. and director of the New York & Queens Electric Light and Power Co., United States Rubber Plantations, United States Tire Co., General Rubber Co. and the American Bank Note Co. Mr. Ford was 84 years old.

Graham-Paige Eight Priced $2,285-$2,485

Company is Now in Production on All Models Announced at Show

DETROIT, March 31—Prices of the Graham-Paige Model 835, the eight-cylinder, 135-in. wheelbase line, scheduled for production this month, are announced as follows:

Sedan (5-pass.)	$2,285
Sedan (7-pass.)	2,410
Town Sedan (5-pass.)	2,385
Cabriolet (rumble seat)	2,485
Coupe (4-pass.)	2,485

These prices include front and rear bumpers and six demountable wood or disk wheels; six wire wheels are $75 extra. The Model 835 is the last of the new line of Graham-Paige cars, announced at the New York show, to go into production, following closely upon the 615 model.

Studebaker Offers ½-Ton Delivery Car

SOUTH BEND, April 2—Announcement has been made of the addition of a new one-half ton delivery car to its line by the Studebaker Corp. of America. Offered in two body styles, a screen body listing at $795 and a panel delivery priced at $820, the new delivery units are mounted on the chassis of the American edition of the Erskine Six. In mechanical design the delivery units of course follow closely that of the Erskine. Loading space, from the driver's seat to the rear door is 74 in., while the width is 48 in. and height 47½ in., giving a total loading capacity of 96.5 cu. ft. The rear opening is 44 in. wide and 40 in. high, while the top of the platform is 28 in. from the ground. This low platform height is obtained by a special sub-frame construction while the floor is sealed from dust or moisture by "J" shaped iron joints.

Following the modern trend in delivery cars the type of bodies are attractively finished with wide belt molding extending the length of the body from the dash back. Standard equipment includes automatic windshield wiper, dome light, rear view mirror, Hydrostatic gasoline gage, and coincidental steering and ignition lock.

Ericson Biflex President

CHICAGO, March 31—M. B. Ericson was elected president of the Biflex Products Co. of Waukegan, Ill., at the annual meeting of the board of directors. Mr. Ericson also retains the office of treasurer. W. G. Pancoast, former president of the company, was elected chairman of the board. W. J. Grotenhuis, vice-president, will assume the office of secretary, formerly held by Mr. Ericson.

Men of the Industry and What They Are Doing

Bonham Named to Europe by General Motors Export

F. A. Bonham has been appointed by General Motors Export Co. assistant to the regional service manager for Europe in charge of service promotion. Mr. Bonham sailed April 5 for London to take over his new work. Until recently, Mr. Bonham was service manager of Durant Motors, Inc., and previously was service manager of Chevrolet Motor Co., also serving on the National Automobile Chamber of Commerce service committee.

Other service appointments by General Motors Export are O. C. Barnett, assistant to the regional service manager for Europe in charge of parts activities; J. J. Barnes, to the staff of the regional director in service work at Montevideo. H. A. Zeller has been assigned to General Motors G. m. b. H. at Berlin; J. J. Adgate as bus and truck specialist at General Motors Brazil, and W. M. Myhre, to the service division of General Motors International A/S at Copenhagen.

Reeves Hurt in Train Wreck

Alfred Reeves, general manager of the National Automobile Chamber of Commerce, has returned to his desk following his annual spring tour of the industry. He reported outlook favorable for first half business. But this trip was not without unusual incident. Mr. Reeves was a passenger on the Broadway Limited that was wrecked, emerging with a shaking up and a wrenched leg.

Coburn Joins Buda

Howard Coburn has joined the Buda Co. as sales representative with headquarters in Cleveland. Mr. Coburn was formerly attached to the Chicago office of the Chilton Class Journal Co., representing the truck division.

Gates Officials on Trip

J. H. Crary and E. J. Tesdell, sales executives of the Gates Rubber Company, are on an extended tour which will cover the country from coast to coast. They will hold sales conferences with district managers and field men.

Heads College Department

F. G. Baender, designer for the International Motor Co., maker of Mack trucks, has been made head of the department of mechanical engineering at the Oregon State College.

Willis Succeeds Clodio

F. B. Willis has been appointed sales manager of Bragg-Kliesrath Corp., succeeding Paul V. Clodio, who has resigned on account of illness.

Congress Authorizes Medal for Edison

Recognition by Congress of Thomas A. Edison as the world's foremost inventor has been authorized under the terms of a bill which has just been approved by the House committee on coinage, weights and measures. The committee authorized $1,000 for a medal to be struck off by the Treasury Department, and for duplicate medals to be sold under regulations prescribed by the Secretary of Treasury.

There was no opposition to the bill (H.J.R. 243), and high praise was paid the aged inventor during the hearing. It was stated that during his career he has applied for 1328 patents, having a monetary value estimated to be $15,599,000,000. Many of his inventions, it was said, are in the field of automotive science, his efforts at the present time being devoted to the development of a synthetic rubber.

Flocker Goes Abroad

A. Flocker, treasurer of Lancia Motor Sales Corp., left recently for a business trip to Europe. He will spend a few weeks in France and proceed thence to the home office of the Lancia company at Turin, Italy. He will return to this country about July 1, at which time it is expected that the recently purchased plant at Poughkeepsie will be ready to go into production, making Lancia cars with imported motors and the rest of the car of domestic manufacture.

McClaren on Vacation Trip

H. L. McClaren, president of the Ajax Rubber Co., is leaving for a trip to the British West Indies. On his return, Mr. McClaren said he expected to make an important announcement regarding his company's plans for development.

Named Fisk Directors

Charles F. Mills and R. B. McGaw have been elected directors of Fisk Rubber Co. Mr. McGaw was reelected treasurer, and Harry G. Fisk was elected clerk. All other officers and directors were reelected.

Petrtyl Leaves Diamond

E. A. Petrtyl, for six years advertising manager of the Diamond T Motor Car Co., Chicago, has announced his resignation as of April 1.

A.A.A. Appoints Bradley to International Board

On the joint proposition of the American Automobile Association and the Automobile Club of America, W. F. Bradley, Paris correspondent of *Automotive Industries*, was elected American delegate of the contest board of the A.A.A. on the International Sporting Commission, at its meeting held in Paris this week.

At this meeting the Royal Automobile Club of Great Britain asked to be relieved of its obligation to hold the European Grand Prix race this year, and Italy offered to organize the event on Monza track, during the month of September. For the first time this race will be open to private car owners, on condition that the manufacturer of the car gives his consent. In the past only trade entries were admitted.

The International Sporting Commission adopted the following racing signals: Yellow flag, stop; blue flag waved, look out; blue flag held still, keep to your own side of the road; the black flag carrying a number indicates that the driver of the car with the number shown must stop.

Vanderveer Moves Office

J. W. Vanderveer, who has been located in Erie, Pa., as chief engineer of the Van Metal Wheel Division of the Erie Malleable Iron Co., has transferred his headquarters to Oneida, N. Y. He will become vice-president and general manager of the Van Wheel Corp. and act as consulting engineer for the Van Metal Wheel Division of the Erie Malleable Iron Company.

Townsend Sees Improved Demand

George H. Townsend, president of the Moto Meter Co., Inc., has returned to the factory after an extended trip and reports there is every indication of great improvement in the accessory business. Increased production of the new Ford car is increasing market opportunities.

Carter Appoints Walker

K. F. Walker has been placed in charge of the Detroit office of the Carter Carburetor Co. Mr. Walker has been connected with the Carter company for 10 years. Associated with him in the Detroit territory are R. H. Herron, S. L. Picard, F. A. Rose and A. W. Fulwiler.

Cleveland Officers Reelected

Officers and directors of the Cleveland Automobile Manufacturers and Dealers Association were reelected at the annual meeting. Herbert Buckman submitted a report dealing with the relationship of used cars to new car sales.

Peerless to Retain Present Management

Reelection of Majority of Board Seen Assuring Continuance of Policies

RICHMOND, VA., April 3—Retention of the present management and maintenance of the present policies of the company were assured by the results of the annual meeting of the Peerless Motor Car Corp., held here today. All but two of the directors were reelected and one new member was added to the board.

The directorate is composed as follows: Robert M. Calfee, chairman of the board; Leo R. German, vice-president and general manager; F. A. Trester, secretary-treasurer; Chas. A. Tucker, general sales manager; George A. Coulton, vice-president, Union Trust Co., Cleveland; H. C. Robinson, vice-president, Guardian Trust Co., Cleveland; Corliss E. Sullivan, president, Central National Bank, Cleveland; H. A. Tremaine, Cleveland; L. J. Wolf, Cleveland; C. H. Larsen, New York City; Edwin H. Parkhurst, vice-president, Columbia Axle Co., Cleveland. Mr. Parkhurst is the new member. The two directors not reelected were V. W. Sincere, Cleveland, and W. R. Angell, vice-president, Continental Motors Corp., Detroit.

The directors will meet on April 19 to elect a president to fill the vacancy caused by the resignation of Edward VerLinden in January. Since that time the business of the company has been conducted by an executive committee composed of Directors Calfee, German, Trester and Tucker.

C. S. Smith

MILWAUKEE, April 2—C. S. Smith, vice-president of the A. O. Smith Corp., died suddenly in Bermuda last Wednesday. Funeral services were to be held in Milwaukee this week.

He was a brother of the late A. O. Smith, founder of the Smith corporation, and an uncle of L. R. Smith, now president of the corporation.

From 1904, when the A. O. Smith Company which later became the A. O. Smith Corporation was organized, Charles Smith became vice-president and retained that position in the firm continuously until last December. At that time he retired and went to Bermuda for his health. While there he was stricken with apoplexy, a second stroke proving fatal.

U. S. Licenses 2715 Planes

WASHINGTON, April 4—A total of 4555 applications have been received by the aeronautics branch of the Department of Commerce, the department announces. Of this number 2715 airplanes have been licensed. California leads in the number of applications with New York second.

Reading to Spend $1,000,000 for Buses

PHILADELPHIA, March 31—The Reading Railway Co. will invest $1,000,000 in bus lines in Schuylkill county, this state, in carrying out a plan to substitute motor transportation service for unprofitable steam trains. The buses will be operated by a subsidiary, the Reading Transportation Co., which has been formed.

Davison Condemns Usage of Old Liberty Engines

WASHINGTON, April 4—Criticism of the Liberty engine for Army aircrafts was voiced here this week by Assistant Secretary of War, F. Trubee Davison, in charge of aviation, following a three-weeks' inspection flight to Panama. He declared that the Liberty motor was obsolete, and urged that their use in Army crafts be discontinued.

"We had continuous trouble with the Liberty motors used in our planes on the trip," he said. "They are too old, too unreliable, too apt to fail at a critical moment. An airplane is no better than its motor, and we have some odd 4000 of these war-time motors left. It is unfair to expect our Army pilots to risk their lives in wearing them out."

Chrysler Says Conditions Alter Value of Records

NEW YORK, April 4—Walter P. Chrysler, president of the Chrysler Corp., in a statement this week said the automotive industry is facing a condition similar to the change which is apparent in financial conditions through the continued rise in security prices the last few years. "Past records are of little value in determining the future," he said. "The old timer has been left far behind by the new order of things."

The reason for the changed conditions, Mr. Chrysler declared, is the tremendous gain in purchasing power of the public.

Suggests Aviation Changes

WASHINGTON, April 4—Eight recommendations for improvement of commercial and touring aviation problems were made at the Sixth National Aviation Congress in Paris.

The recommendations were as follows: (1) Planes should be easy to maintain and economical to operate; (2) of simple and sturdy construction; (3) easy to take apart and reassemble; (4) standardized parts; (5) sturdy engine; (6) easy to land and take off at low speed; (7) greater speed; and (8) more safety appliances, such as fire extinguishers, parachutes, etc.

Financial Notes

Studebaker Corp. of America will earn about $4,000,000, or slightly more than $2 a share on common stock in the first quarter of the year, according to A. R. Erskine, president. This compares with $3,402,000 or $1.74 a share in the first quarter last year. March sales were the largest for any month in five years, and with one exception, the best month in the company's history. First quarter sales set up a new record. Export sales for the month, including Canada, totaled 2789, also a new month record.

Morse Chain Co. has sold a new issue of $2,000,000 twenty-year 6 per cent sinking fund gold debenture bonds due Jan. 1, 1948, to retire $1,500,000 outstanding 8 per cent preferred stock and to provide funds for other corporate purposes. A large part of the issue has been taken by holders of company preferred stock who had prior subscription rights. The debentures will be the only outstanding funded debt of the organization.

Omnibus Corp. of Chicago, which holds 75 per cent of the interest of the New York Transportation Co. in the form of shares in the Fifth Avenue Bus Securities Corp. stock, reports net profit for 1927 of $948,915. This compares with $805,904 for 1926. Profits of the New York Transportation Co. were $1,118,456 while net income of the Fifth Avenue Bus Securities Corp. was $380,713.

Curtiss Aeroplane & Motor Co., Inc., has called for redemption, on June 6, 25,231 shares of 7 per cent preferred stock at $141.50 a share and accrued dividends. To provide for this redemption, the company has extended to its stockholders of record April 9 the right to purchase at $52 a share 72,686 additional shares on the basis of one share for every three held. The rights expire May 10.

Fageol Motors Co. of California reports for 1927 a balance of $94,010, after all charges and preferred dividends, equal to 47 cents a share on the 200,000 shares of common stock outstanding. This compares with net income of $84,294 in 1926. Sales for the first quarter of 1928 are reported nearly doubling those in the same quarter last year.

Vacuum Oil Co. has increased its authorized capital stock from $70,000,000 to $175,000,000 making it possible to distribute the 100 per cent stock dividend determined upon some time ago. Net profit for 1927 after depreciation and taxes was $25,559,899 comparing with $24,133,655 in 1926.

Curtiss Aeroplane & Motor Co., Inc., has increased the number of common no par shares from 218,060 to 300,000. The number of preferred stock shares, par value $100, remains unchanged at 27,315.

Murray Corp. of America reports for 1927 a net profit of $279,756, after all charges, equivalent after preferred dividends to 97 cents a share on common stock.

Stover Extension Asked

RACINE, WIS., April 2—The creditors' committee of the Stover Signal Engineering Co. has requested that creditors extend the time for payment of accounts to April 1, 1929.

Retail Sales Show Continued Improvement

(Continued from page 564)

quarters. Improved sales practices with regard to both new and used cars are helping dealers in promoting sales. Used cars are being moved steadily at prices more consistent with trade-in allowances and show little disposition to assume unwieldy proportions.

Reports from leading centers follow:

Boston

Motor car dealers will finish the first quarter with a larger total of sales by far than they did for the same period of a year ago. Expectations for April are very high just now. A majority of dealers say the recent show was a 50 per cent show for sales, but better than 100 per cent for prospects. Last year to March 1 there were 342,158 cars registered. Up to March 1 this year there were 378,578. Trucks increased 1425 for the same period.

New York

March has shown a considerable improvement in the sale of new and used cars, although the spring drive is not fully under way. Conditions are not uniform throughout the market but low and medium priced cars have been sold almost as rapidly as delivery could be made during the past month. The used car market is somewhat spotty but generally much more stable than it was a few months ago.

Atlanta

Though erratic weather interfered with March sales, new car business is reported by most dealers larger than March, 1927, making first quarter volume well above that of last year, and indications are that the first half of the year will establish a new Atlanta and Georgia record. Ford sales are heavy but few deliveries can be made. Stocks of new cars in dealer's hands are reported normal. Used car stocks are rather large but being kept as low as possible by sales at sacrifice prices. New truck sales are reported approximately 25 to 30 per cent larger than last season.

Detroit

New car sales have shown considerable increase in March and dealers are of the opinion that with the coming of better weather more favorable conditions will prevail. Used car stocks are approximately 10 per cent greater than a year ago. The last week in February and the first two weeks of March saw a sharp increase in used car sales but the last two weeks of the month revealed a slackening in demend. Dealers are confident, however, that the demand for used cars will increase with the coming of spring. Truck sales continue to fall far short of last year's volume. Ford dealers in the Detroit area are receiving more new cars than heretofore.

Cincinnati

Spring weather has brought prospects in in such numbers as to convince dealers that the next 90 days will bring a demand in excess of last year, with many forecasting a record season. Sales have been slow in the metropolitan district during the past month but distributors characterize the wholesale business as unusually good. Used car sales are keeping up exceptionally well. Ford deliveries are increasing daily and dealers say they have orders on hand sufficiently to keep the local plant at top speed for the next 60 days. Truck sales are beginning to be a factor in registrations. General business is good and a healthy condition is reported by bankers.

Chicago

New and used car sales in March showed a material increase over February, being helped to a great extent by the spring weather. New car stocks are below normal, dealers in many cases being behind orders. Used car stocks are below normal for the season, the unusual weather being largely responsible.

Cleveland

Exceptionally good used car business has followed lower prices. New car sales, however, were not in quite the same class, salesmen reporting difficulty in persuading owners to turn in old cars at present low appraisals. Whether present low appraisal policies can be maintained, in face of pressure from factories to move cars, was subject of warm discussion. Business in some lines affecting the automotive industry was reported steady for the month.

St. Louis

Indications are that, with a continuance of the present mild weather, spring business this year will be good, new car sales for March showing a 15 per cent increase over March last year. New car stocks in warehouses are ample to supply the demand, but not heavy. Used car business also has been satisfactory during March.

Kansas City

Motor car sales in March were somewhat spotty but on the whole showed a substantial gain over last March. Several lines set new all-time records. Deliveries have been held up on several new models because of shortage at factory. Ford deliveries have increased. Stocks of new cars in most dealer's hands are low. Used cars have been selling well and stocks are lower than in years. Dealers have cut the trade-in values on used cars materially.

Minneapolis

Real spring has arrived in the Twin City automobile distributing territory, because of which the hearts of the dealers are warmed up to business activity. A few days of warm weather is expected to put the main highways into fine condition. Many distributors haven't enough cars to take care of demand. The used car situation is improved. The outlook hasn't been better for some time.

Milwaukee

Distributors and dealers feel greatly encouraged in surveying prospects for passenger car business in April by the fact that Milwaukee factories are employing more persons than at the peak of 1927. At the rate of absorption so far this year, new car stocks at the beginning of April are not considered heavy, despite the fact that shipments from factories have increased substantially. The used car situation shows improvement, despite the heavier supplies in dealers' hands. The public has undergone a change of mind respecting the value of used cars, largely because of the junking operations of the dealers' salvage company. This interest salvaged 146 cars in February, or a total of 1054 cars since beginning operations in July, 1927.

New Orleans

The automobile situation is far from satisfactory. There is a general business depression in the city. Chevrolet has had a phenomenal run of sales. All others have slumped. Sales of both light and heavy trucks are slightly below last year. New Fords not going quite as well as expected.

Denver

Spring weather has reached Colorado, and has brought with it a considerable revival in car sales, both new and used. It is reported that the local Ford factory will be in production next month, and that will go a long way towards catching up with Ford orders. With the exception of Fords, stocks of new cars are quite large for this time of year. Used cars are well worked out.

Dallas

Automotive business in Texas and parts of adjoining states during March continued to show improvement, especially in sale of new cars. This was due in large measure to automobile shows at Fort Worth, Houston, San Antonio, Amarillo and a few other places. Actual retail sales about the same as for March, 1927. Deliveries for Fords has begun but dealers have no stocks. Dealers in low priced cars are not heavily stocked. Medium priced cars selling well. Usual number of high-priced cars being sold. Increased sale of new cars have boosted used car stocks in most sections.

Los Angeles

While showing a seasonal increase over February, March failed to come near the March total of last year by a considerable margin, reflecting generally slower business conditions in southern California. New car stocks in dealers hands are slightly higher than for the same period last year. Used cars continue to move well. Some improvement is shown in the truck market, but still below expectations.

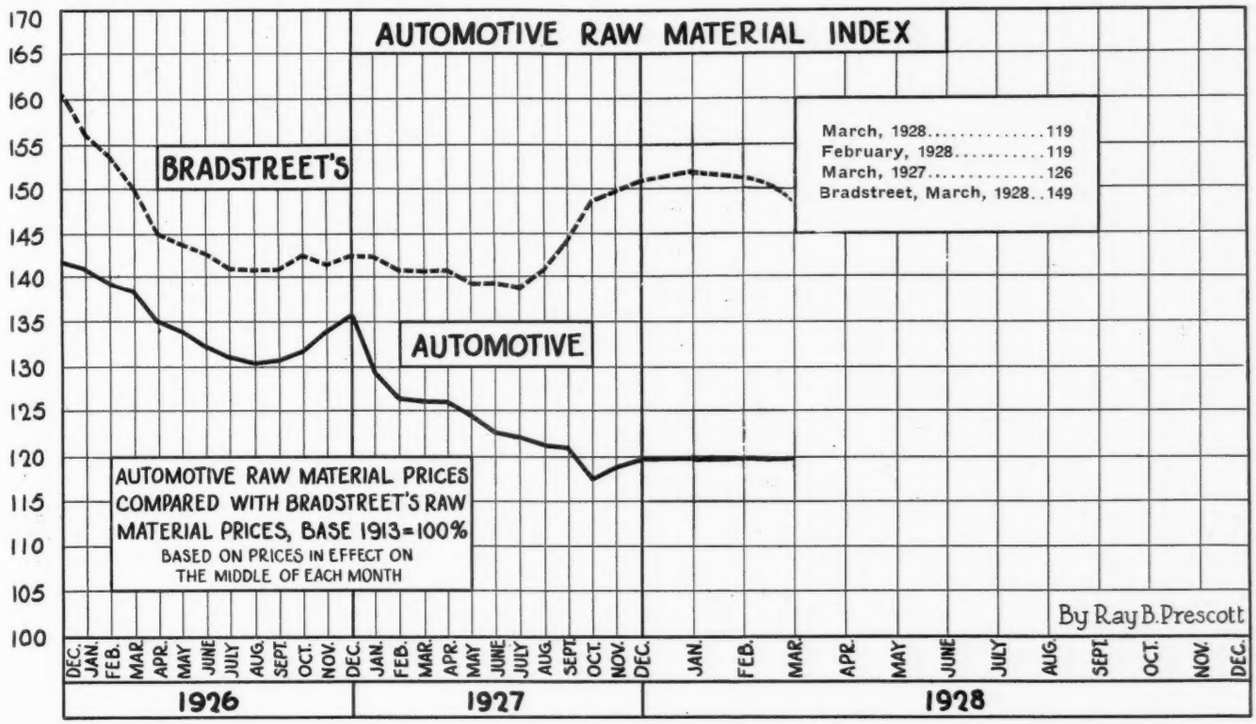
San Francisco

Passenger car sales for March show about 15 per cent increase over February of this year and 10 per cent over March of last year. The last half of the month was better, due to improved weather. Trucks are moving probably 25 per cent better than last month. Used cars are slower, owing to improvements in low priced new cars and recent price reductions.

Seattle

Retail car sales averaged about 10 per cent behind March, 1927. Dealers account for this situation by explaining that the public is more conservative and that more people are holding their cars an extra year. There is plenty of money in this section and farming regions particularly have had a good year. The used car market is in good shape.

Raw Material Prices Continue February Level



N.S.P.A. Now Organizing Independent Repairmen

DETROIT, March 31—As a result of the recent meeting sponsored by the Baldwin Auto Parts Co. and other Detroit jobbers, a new local repairman's association in Detroit is being organized. The meeting was addressed by Tom Duggan, merchandising service director of the National Standard Parts Association. The association which is being formed as a result of this meeting plans to help its members apply standardized flat rates in their work, together with other sound merchandising practices that are a part of the N.S.P.A. merchandising policy.

Previous to the Detroit meeting Mr. Duggan also conducted similar meetings in Lansing, Saginaw, Bay City and Port Huron. At Lansing the meeting was sponsored by the Paul Automotive Parts Co. The meeting at Saginaw was addressed by Mr. Duggan and his assistant, C. W. Monahan, and it was sponsored by the Northern Automotive Supply Co. The following evening the same company sponsored a similar meeting at Bay City. Jack Buckley, a Port Huron jobber, arranged the meeting held in that city.

Develops Fabrikoid Panels

NEW YORK, April 2—The fabrikoid development and advisory service of E. I. duPont de Nemours & Co., has developed custom designed and decorative panels of fabrikoid designed to express individuality of different makes of motor cars. Designs are embossed in contrasting colors to bring out details of line and pattern. Door panels of this type are now being featured in open cars produced by Chrysler, Chandler, Oakland, Pontiac and others. This company also has developed a spare tire cover of fabrikoid.

Czech Registration 38,507, One to 401 Inhabitants

WASHINGTON, April 4—The first census of motor vehicle registrations in Czechoslovakia shows a total of 38,507 cars, according to a report just received by the Department of Commerce. The registrations are divided as follows: Passenger cars, 16,880; trucks, 6400; buses, 676; motorcycles, 14,551. Comparing the registration to the population, the figures show a ratio of 401 inhabitants to each motor vehicle in the country. Comparing Czechoslovakia with neighboring countries of Europe, the ratio is as follows: Germany, 196 to one; Austria, 316 to one; Hungary, 965 to one; Rumania, 1040 to one, and Poland, 1500 to one.

Of the total 16,880 passenger cars registered, 9673 or 57 per cent were of domestic origin. United States ranked fifth on the list of countries, furnishing 1342 of the total registration number.

Mexican Sales Improved

WASHINGTON, April 4—While business conditions generally in Mexico showed little improvement and are still sluggish, the automotive situation is reported as improved by the Department of Commerce's representative in Mexico City.

N.A.C.C. Endorses Bill to Widen Buying Power

NEW YORK, March 31—The National Automobile Chamber of Commerce has issued a bulletin to its members calling attention to a bill introduced in congress by Congressman Crampton, which would lodge discretionary power to accept or reject bids for purchase of material with the several department heads of the government instead of with the comptroller general as at present.

Under the present law the comptroller general is required to make awards to the lowest responsible bidder and this has not always proved satisfactory to the various department heads purchasing materials. The motor truck committee of the N.A.C.C. has gone on record as endorsing the Crampton bill.

Belgian Tire Exports Grow

WASHINGTON, April 4—Tire and rubber manufacturers of Belgium at the present time are supplying approximately 25 per cent of the Belgian market, according to advices received by the rubber division of the Department of Commerce. The largest manufacturer in that country at the present time, and the only one which enters seriously into the export field in Europe, is the Englebert company, which, at the present time, is manufacturing approximately 1000 tires daily. Imports of tires and casings into Belgium during 1927 decreased 8 per cent in volume, compared with 1926. Exports for 1927 showed an increase of 54 per cent.

Steel Demand Holds Mills at Capacity

Automotive Consumers Continue Heavy Buying—Ford Buying Grows

NEW YORK, April 5—What slight tapering-off in fresh steel demand is reported hardly applies to automotive consumers. Full-finished automobile sheets continue to be called for in tonnages that tax the full capacity of finishing mills. Blue annealed sheets hold steady. Black sheets move freely, and occasional shading of prices denotes intensive competition among mills rather than a dip in demand. A similar condition prevails in the strip-steel market.

Specifications against old low-priced contracts for hot-rolled strip assumed large proportions immediately preceding the quarter's turn, and many consumers have their full April requirements covered in this manner. Some of the smaller mills, anticipating a possible tightening-up in orders for cold-rolled strip-steel, have named concessions which virtually continue old prices in force. The market for hot-rolled steel bars rules very easy and consumers are no longer worrying about anticipating their requirements for cold-finished bars, so as to avoid a possible bulge in the price of the basic material.

Automotive alloy steels are in good demand, prices having settled on the revised basis recently announced. For small lots mills are obtaining a $2 per ton differential over tonnage prices. Automotive consumers are specifying freely against bolt and nut contracts previously closed.

Non-integrated sheet rollers whose average billing prices have not been sweetened very much so far because of heavy shipments at old prices have at least the satisfaction of the $34 price level continuing in the sheet-bar market. Increase in the buying of Ford Motor Co. is noted in the Mahoning Valley activities, but the general impression is that Ford orders carry run-of-the-market prices and do not come in for the concessions that formerly attended their placing. Automotive demand for tool steels is running at an exceptionally good rate.

Pig Iron—Automotive foundries have ordered forward for April shipment about the same tonnages as their March operations necessitated. The market has turned rather quiet. The Michigan market for malleable and foundry rules steady on an $18.50 basis.

Aluminum—A very fair tonnage of aluminum has been contracted for by automotive consumers for current quarter shipment, and more demand is coming out from day to day. Alloy and remelted metal producers look for a brisk demand from motor car and parts manufacturers in April. Prices are unchanged.

Copper—Heavy sales just before the turn of the quarter lifted prices fractionally not only for the metal, but also for most copper and brass products. Bare copper wire was advanced ⅛ cent to 16 cents and for magnet wire a price of 17 cents was announced. Brass, bronze, nickel silver products were not changed in price at the time.

Tin—Tin prices have made further progress on the road toward recovery. Consumers are rather indifferent, and because of this, importers, even though convinced that further advances are in the offing, are reluctant to commit themselves heavily.

Lead—The market has grown firmer, so much so that in some quarters slight premiums over the leading producer's contract price are being asked.

Zinc—Smelters are not disposed to push metal for sale until the ore market is in a more settled condition.

Gasoline Study Shows Increased Volatility

WASHINGTON, April 4—There is now little difference between winter and summer grades of gasoline, according to an announcement of the Bureau of Mines, at the completion of its seventeenth semi-annual gasoline survey. The department announces that the survey indicates that gasoline that is being marketed in the United States at the present time is, in general, more volatile than that sold a year ago. This increase in volatility is shown by a lowering of the distillation temperatures, ranging from 2° F. at the average initial boiling point to 5° F. at the average end point. The detailed results of the survey may be obtained from the department by asking for Series 2861 of the U. S. Bureau of Mines.

Citroen Engineers Arrive

NEW YORK, April 4—Paul Vavon, chief engineer of the Andre Citroen Societe anonyme, and M. M. Houdin, Louis Citroen, Jouffret, Cuinet and Courtin, all of the engineering department of the same company, arrived yesterday on the Ile de France for a tour of research in the automotive industry in this country. They will also make large purchases of plant equipment and machinery while here.

Curtiss Race May 18

WASHINGTON, April 4—The contest committee of the National Aeronautic Association has tentatively set May 18 as the date for the Curtiss Marine Trophy Race for seaplanes, to be held in Washington. A $5,000 trophy will go to the winner. The race was held here for the first time on May 14, 1926. Contesting pilots and planes will be drawn from the Naval Air Service, and probably will number 10 or more for the 80-mile race on the Potomac River. The trophy at stake was donated by Glenn H. Curtiss.

Cadillac Gives Aims of Used Car Program

Special Advertising Material and Suggestions for Display Are Furnished

DETROIT, April 2—Outlines of a program now in operation for placing the used car business of Cadillac-La Salle distributors and dealers throughout the country on the same high level of activity and sound business practice as the new car business have just been revealed by W. W. Lewis, assistant general sales manager of the Cadillac Motor Car Co.

The plan is called the Cadillac Co-operative Used Car Program and includes the following features:

A newspaper, magazine and billboard campaign financed by the factory.

A separate advertising activity by distributors and dealers. (The factory supplies mats and sample copy for these advertisements.)

Sales helps provided by the factory for used car salesmen.

Merchandising methods suggested by the factory and distributors.

Enlisting the cooperation of all employees in securing used car prospects; and paying employees for any such prospects who are sold.

An adequate accounting system, with particular reference to proper allocation of used car costs and income.

Providing usable plans for display of used cars; for organizing salesmen's work; for reconditioning used cars, and for helping used car managers to work more effectively.

Establishing the used car business on a sound merchandising basis.

In addition to the detailed plan, the program requires close and constant cooperation of distributors and dealers with the factory. It calls for the expenditure of money by them and by the factory. And the final essence of it is intelligent, consistent hard work, Mr. Lewis said.

Murray Appoints Dowell

DETROIT, March 31—A. F. Dowell has been appointed general superintendent of No. 1 (body division) of the Murray Corp. of America. Mr. Dowell has been associated with the automobile body manufacture for 19 years, starting with Briggs Mfg. Co., where he became vice-president and assistant general manager. During the last seven years he has been connected with Fisher Body Corp.

Gates Tire Sales Double

DENVER, April 2—Gates Rubber Co. sales in the first quarter of 1928 increased better than 100 per cent as compared with the first three months of 1927. These tires are sold exclusively through regular jobber channels and this marked increase in business is accounted for not alone by greater sales on the part of jobbers well established but by new jobbers attracted.

Europe Seeks Plan to Combat U.S. Cars

Desire for Joint Action Seen Though Bureau Declines to be Party

PARIS, March 24 (*by mail*)—"The Bureau Permanent will not be made use of for any campaign against the American automobile industry," declared Henry Cezanne, secretary of that organization, in commenting upon news stories having appeared in American daily newspapers.

"The Bureau Permanent is an international association of automobile manufacturers in which America is represented. Its object is to work together for the common good, and we should be defeating the object for which it was formed if we allowed any faction to work against any other faction. It is quite incorrect that at our May meeting a proposition will be brought forward to form a European cartel," explained M. Cezanne.

American newspapers have carried stories to the effect that European manufacturers are working to form a cartel to keep the American automobile industry out of the European market. According to these stories, there would be a uniform tariff for European cars, while American machines would be admitted on a quota basis, that is, a fixed number of American cars would be allowed to enter the European markets each year. A proposal to this effect was made at the last meeting of the Bureau Permanent, by Signor Nanni, sales manager of the Isotta Fraschini company, the Italian delegate, but it was immediately opposed by the American delegate, George Bauer, and was ruled out of order. According to the statement of Secretary Cezanne, this subject will not be allowed to come up for discussion at the May meeting.

While the Bureau Permanent will not be a party to any campaign against the American industry, there is a feeling throughout Europe that some joint action should be taken to protect the industry against American competition. In France, Lucien Rosengart, formerly vice-president of the Peugeot company, is active in this direction. The difficulties of such a campaign are great, for the various European countries are keenly competitive and it appears almost hopeless to induce them to sink their personal differences for the common good.

Central Buys Motor Coaches

NEW YORK, April 3—The New York Central Lines have purchased eight Brill-Westinghouse gas-electric engine steel passenger cars, five of which will go into service in Michigan and the rest in various parts of New York State. The first of these cars will be delivered within a few days.

Car Thefts in 1927 Show 91.7% Recovered

CHICAGO, April 2—Thefts of automobiles in 28 cities in the United States totaled 95,083 in 1927. Of this number 87,186 were recovered or 91.7 per cent, according to a survey by the National Automobile Dealers' Association. This compares with 95,225 thefts and 85,114 recoveries in 1926. Thefts in 1918, the first year in which statistics were kept, totaled 27,445 and there were 21,673 recoveries.

1928 Safety Contest Announced to Schools

WASHINGTON, March 31—Offering $6,500 in prizes for the best essays and lessons on street and highway safety, the Highway Education Board is announcing to the schools the annual safety contest open to elementary school pupils and elementary school teachers of the nation.

The $6,500 in prizes is given by the National Automobile Chamber of Commerce, and this year includes 442 state prizes for elementary school pupils, three national prizes for pupils, and three national prizes for teachers, the latter totaling $1,000 in cash. In addition, the pupil and the teacher whose essay and lesson respectively are chosen as the best in the nation are given a trip to Washington with all expenses paid.

This year, according to the rules, pupils are to write essays of 500 words in length on the subject "Why We Have and Practice Traffic Rules." Teachers are given the subject "Objectives and Methods of Education in Street and Highway Safety," on which they are asked to prepare practical lessons for use, not alone in their own class rooms, but by other teachers in the class rooms of the nation as well.

Exports in February 10.5% of Production

Total 33,952 and Valuation Increases 14.1 per Cent to $36,557,726

WASHINGTON, April 4—Exports during February, according to revised figures of the U. S. Bureau of Foreign and Domestic Commerce, totaled $36,557,726, or an increase of 14.1 per cent over January this year, and 13.3 per cent over February a year ago. Total production during February of this year amounted to 323,368 units, the revised figures show, of which 33,952 units were exported. Of the total exports, 25,114 were passenger cars and 8838 were trucks. The ratio of exports to production in the passenger car field was 8.6 per cent, while 27.2 per cent of the total truck production was exported during February. In February of 1927, the total production was 304,763, of which 31,475 units, or 10.3 per cent, were exported. Of the total 264,171 passenger cars produced in February 1927, 8.1 per cent were exported, and of the 40,592 trucks produced, 24.9 per cent were exported.

February import of automobiles and chassis totaled 25, valued at $102,861.

10 States Reduce Number of Automobile Fatalities

NEW YORK, April 4—Improvements in highway safety records were shown by 10 states during 1927, according to figures just filed by the National Automobile Chamber of Commerce. Illinois showed the largest numerical gain, with a drop from 1776 fatalities in 1926 to 1647 in 1927. Montana showed the highest percentage in fatality reduction by 22 per cent. Other states showing improvement were Arkansas, Florida, Massachusetts, New Hampshire, New Mexico, Oklahoma, Rhode Island and South Dakota.

New York, New Jersey and California showed higher death tolls in 1927 than in 1926. The record of the country as a whole showed an increase in fatalities of 8 per cent.

European Mid-Week Holidays Help Relieve Week-End Traffic Congestion, Says Mooney

Super-highway systems carrying one-way traffic and separating commercial and passenger cars are regarded by J. D. Mooney, president of General Motors Export Co., as one of the remedies which will be applied to the present traffic jam which is affecting not only this country but the whole world.

Another remedy which is already being applied in certain European countries, Mr. Mooney describes as the "week-end plan," whereby numbers of persons who motor for pleasure take their half-holiday in the middle of the week instead of on Saturday, thus avoiding much of the week-end congestion.

The super-highway system Mr. Mooney regards as the best cure for this "highway arterio sclerosis." By the super-highway, he conceives a system of one-way boulevards running to and from all important centers, separating heavy commercial traffic from light car traffic and avoiding all grade crossings. Such a system, he says, is already in process of formation, pointing to Detroit's extension of Woodward Avenue to Pontiac, Mich., and to the work which is in process in Wilmington, Del.

Senate to Hear Ford After Trip Abroad

WASHINGTON, April 4 — Henry Ford will be called to testify before the Senate soft coal investigation to relate his experiences as a coal operator, and to offer suggestions for improving working conditions and wages in the mines, Chairman Watson has announced. The committee announced that it would issue a subpoena for the automobile manufacturer, but that the subpoena would not be issued until it was ascertained what date would be most convenient for Mr. Ford. The committee announced that it did not consider it necessary to interfere with Mr. and Mrs. Ford's trip to Europe.

Tribute to Mr. Ford's operation of his coal mines was paid by Percy Tetlow, president of the West Virginia district of the United Mine Workers, testifying for the committee. He declared Ford miners were paid an average of $8 a day for eight hours' work, as contrasted with wages as low as $2.85, paid by competing mine owners.

Marmon Ships Trainload

INDIANAPOLIS, March 31 — The first trainload of automobiles ever to be shipped from Indianapolis to Canada has left the loading docks of the Marmon Motor Car Co. for Montreal. The shipment was to the Canadian Motor Sales Co., Marmon's new distributor in Montreal. Production of the Marmon factory is progressing at the rate of 150 cars a day.

Coming Feature Issues of Chilton Class Journal Publications

June 10—A. E. A. Summer Meeting Number — Motor World Wholesale

June 23—Engineering Issue—Automotive Industries

Chryslers Win Honors in Paris to Nice Run

PARIS, March 19 (*by mail*)—Three Chrysler cars, driven by Stoffel, De Vere and Lamy were among the competitors finishing with a clean score in the Paris to Nice 800 miles reliability trials and speed tests. A fourth Chrysler, driven by Rossignol, turned over when the driver attempted to avoid a cyclist six miles from the finishing line. The Chryslers run in this competition were those intended for the Rudge Whitworth Cup 24-hour race at Le Mans, next June, and were put in the Nice competition merely as a preliminary tryout. They were stock models with roadster bodies, fitted with the Red Head engine.

N. J. Raises Speed Limit

TRENTON, N. J., March 31—The New Jersey Assembly has passed a bill authorizing a maximum speed of 35 miles an hour with a penalty of $50 fine or 10 days imprisonment, or both, for every violation.

Bureau of Standards Studies Carburetors

WASHINGTON, April 4—A resume of research work and laboratory investigations in the automotive and allied industries has just been made by the Bureau of Standards.

The bureau estimates that as result of the adoption of standards for automobile brake linings, now being used by manufacturers, that the increased life of the average brake lining is four times what it formerly was, resulting in a saving of approximately $15,000,000 a year to automobile users of the product.

Rapid strides are being made in the testing of aircraft engines, at high altitudes. The bureau's altitude laboratory has been so remodeled that the largest engines may be tested under atmospheric conditions seldom reached in actual flights.

The bureau is now concentrating on carburetor problems of automobiles, operating under approximate sea-level conditions, as well as carburetors of airplanes at high altitudes. Another phase of the work at the present time is the study of various fuels for aircraft engines.

Brown Moves Detroit Office

DETROIT, March 31—The Brown Instrument Co. has moved its Detroit branch to larger quarters in the Maccabee Building, the change being made necessary by increased business. R. W. Mayer is district manager.

Calendar of Coming Events

SHOWS

All-American Aircraft Show, Convention Hall, Detroit.....April 14-21
American Electric Railway Ass'n, Public Auditorium, Cleveland...Sept. 22-28
American Society for Steel Treating, Commercial Museum, Philadelphia .....Oct. 8-13
Automotive Equipment Association, Coliseum, Chicago .....Oct. 22-27
Berlin .....Nov. 8-18
Brussels .....Dec. 8-19
*Chicago .....Jan. 26-Feb. 2
International Aircraft Show, Berlin, March 23-April 11
Layback, Jugoslavia .....June 2-11
Lille, France .....April 6-22
London, passenger cars .....Oct. 11-20
National Standard Parts Association, Cleveland Auditorium...Oct. 29-Nov. 3
*New York .....Jan. 5-12
Oran, Algeria .....April 1-May 31
Paris, passenger cars .....Oct. 4-14
Paris, trucks .....Nov. 15-25
Prague .....Sept. 1-9
Rio de Janeiro .....May 3-13
Tunis, Tunisia .....April 27-May 6
United States Good Roads Show, Des Moines .....May 28-June 1
Zagreb, Jugoslavia .....April 29-May 6

***Will have special shop equipment exhibit.**

CONVENTIONS

American Electric Railway Ass'n, Public Auditorium, Cleveland...Sept. 22-28
American Gear Manufacturers Association, Hotel Seneca, Rochester, N. Y. .....April 19-21
American Society for Steel Treating, Commercial Museum, Philadelphia .....Oct. 8-13
American Society for Testing Materials, Chalfonte-Haddon Hall Hotels, Atlantic City, N. J. .....June 25-29
American Welding Society, Engineers Society Bldg., New York...April 25-27
Automotive Engine Rebuilders Association, Coronado Hotel, St. Louis, June 11-14
Automotive Equipment Association, Grand Hotel, Mackinac Island, June 10-16
Automotive Equipment Association, Coliseum, Chicago .....Oct. 22-27
Chamber of Commerce of the United States of America, Washington May 8-11
National Association of Credit Men, Hotel Olympia, Seattle, Washington .....June 11-16
National Foreign Trade Council, Houston, Texas .....April 25-27
National Hardware Association of the United States, Metal Branch, Copley-Plaza, Boston .....May 3-4
National Safety Council, Central States Safety Congress, Kansas City April 23-25
National Safety Council, National Congress, New York .....Oct. 1-5
National Standard Parts Association, Hollenden Hotel, Cleveland, Oct. 29-Nov. 3
Overseas Automotive Club, Luncheons, Hotel Astor, New York April 12, May 10 and June 14
Society of Industrial Engineers, Rochester, N. Y.....Oct. 17-19
United States Good Roads Association and Bankhead National Highway Association, Des Moines.May 28-June 1

A. S. M. E.

Cincinnati, Oct. 22-25—Machine Shop Practice.
Cleveland, Sept. 17-20—Fuels.
Detroit, June 28-29—Aeronautic Division.
Philadelphia, April 23-24 — Materials Handling Division, Benjamin Franklin.
Pittsburgh, May 14-17—Spring Meeting.
State College, Pa., June 14-16—Oil and Gas Power.

S. A. E.

National

Quebec, Chateau Frontenac ....June 26-29

Sectional

Chicago, April 10 — Development of Aluminum for Automotive Purposes—R. S. Archer.
Cleveland, April 9—The Air Cruiser—Thomas M. Finley.
Detroit, April 17-18—Aeronautic Division.
Detroit, April 23—Body Division—Trend of Design—H. A. Brunn.
Indiana, April 12—Piston Rings—Ralph Teetor.
Metropolitan, April 19—Truck Meeting.
New England, April 11—The Most Powerful Aircraft Engine in the World—L. M. Woolson.
Northern California, April 12—Problems of Maximum Range in Aeroplane Design—Dean Baldwin M. Woods; Superchargers—J. Milton Davies; Fans and Air Flow Through Radiators—Carl J. Vogt.
Pennsylvania, April 17—Traffic Regulations—Miller McClintock and Albert Russell Erskine.
Southern California, April 13—Chassis Lubrication.
Washington, April 17—Racing and Results—Wade Morton.

RACES

Altoona .....June 16
Atlantic City .....May 5
Belgium .....Aug. 12
Detroit .....June 3
France .....July 1
Germany .....July 15
Great Britain .....Sept. 22
Indianapolis, Hispano-Suiza and Stutz April 16
Indianapolis .....May 30
Italy .....Sept. 2
Spain .....July 29